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### SPECIAL CONDITIONS VERSUS ECONOMIC LAW.

After holding up prices for more than a year against lower prices of the independent companies, the United States Steel Corporation has been forced to lower its trade colors, drop prices and meet actual conditions. This, in itself, is a significant symptom of the slow outworking in a normal way of the law of emergence from hard times. But it has been accompanied by a symptom still more noteworthy. Wages have been lowered by a number of the smaller steel concerns, the reduction of wages has also extended to some iron producing interests, and there are prophecies and omens of other wage reductions to come. The situation raises an important question bearing upon the momentous subject of the time and process of full recovery from industrial depression and renewal of national prosperity. Is that recovery to come as it has come from every great industrial depression of civilized nations in

the past, by the lowering of wages and the cost of living—that is to say, of the prices of commodities—and is the break of prices and wages in the steel industry the first sign? Or on the other hand, are special conditions in the country to tide us over the gulf of hard times and relieve us from what has been hitherto the inexorable fiat of political economy? And is the break in steel but a temporary incident, not a harbinger?

The question is one of great import to the railways of the country, which, indeed, have been in some ways both an index and a reflection of the national problem. When, in December of 1907, the railways were hit suddenly and hard by reduction of earnings—"chopped off as by an axe" as a prominent railway president expressed it—the railways under normal conditions would have had several expedients of breasting the storm. First and foremost was the reduction of wages. This, with stoppage of extensions and improvements, and sharp economies in train service, would have gone far toward ameliorating the stress. But conditions were not normal. There was not, for one thing, the usual and expected fall in the cost of railway supplies. There was not then, and there has not been since, the fall in the cost of living, upon which, as a broad and underlying dictum, wage reduction can be most justly predicated; and there were the hostile attitudes of federal and state authority, the complications of a "presidential" year and the high organization of labor. Such a situation forced the railways to novel measures of economy or, more exactly speaking, certain normal measures adopted in an abnormal degree. A reduced rate of wages bore nothing of the brunt. It was instead a matter of reduced force, reduced maintenance, reduced purchase of supplies and, in a good many cases, reduced operation, the latter not seldom attended by public outcry. Stated more succinctly, the railways in an irregular way have had to go through that painful ordeal of contraction that bridges the gulf between one period of prosperity and another.

General interests of the country, industrially and financially speaking, undoubtedly have had to suffer contraction, too, but in far less degree, taking them as a whole, than the railways. Wages have not contracted in rate, and hard times have not yet, apparently, tamed the spirit of the labor organizations, though doubtless affecting somewhat their general attitude and policy. Up to the break in steel, cost of commodities have fallen but little, and of immediate cost of living hardly at all. The luxuries of the rich, and even of the merely well-to-do, seem but little abated; and in a large section of the West and Northwest hard times have been well nigh nonexistent. Yet, paradoxically enough, such a situation has been paralleled with no conditions of decided trade recovery such as, for example, would be indexed by the large increase of railway gross earnings and decrease of idle cars.

The great interrogation mark, then, set against the future and deepened by the break in the vast industry represented by steel and iron, is whether great and general interests outside the railways are to confirm the law of political economy and recuperate through that contractive process which the railways already have undergone. Are wages and commodities to fall, demand be quickened by their fall, and business revive on the enlarged and firm basis of production? And will production in its turn be quickened by demand? Or, on the other hand, are there special forces and elements that will resist successfully the economic precedents of the past? Some special and exceptional forces of the kind can be described. These are the high organization of flexible capital in great volume, fundamental resources of the country, cheap money and high production of gold as a world influence against contraction of prices and, therefore, of wages. Will these, and more transitory influences, such as a readjustment of the tariff, counteract as against what has hitherto been almost an economic axiom?

No man can answer that final question or determine whether the break in steel is a forecast or a limited episode. But in the

case at bar of special conditions *versus* economic law, the railways have at least one ground of self-congratulation. They have passed through the throes of contraction, or through most of them. Lower prices, lower wages and consequential increase of demand, should they come, connote increased business, saying nothing of the effect on such commodities of first necessity as structural steel and rails. The railway contraction, especially upon Eastern lines, has been searching and painful, but now happily it is mainly in the past tense. There have been sad railway experiences, but not a few of them have been disciplinary.

Amid the multitude of confusing experiences and indications, however, we may once more indulge the reflection that from the bed-rock of contraction there can be rebound only in one direction, and that upwards. There are exceptions, of course. Some railways have not contracted enough; in others, contraction has exposed radical infirmities and left them staggering. But the great majority of them have contracted to the hard-pan, whence they can look hopefully to the future whether its problem is solved by time-honored economic law or by forces which are so new that we do not dare to class them as of either law or logic.

#### RAILWAY MAIL PAY.

In the past ten years the United States postal revenues have increased from 89 millions to 191 millions, being 115 per cent. During the same period the railway mail ton mileage has increased 78 per cent., while the gross payment for it has been increased only 40 per cent., and this in spite of the fact that other post office expenses have been increased 152 per cent. This situation and the heavy burden of loss which is laid by the government on the railways has been carefully analyzed by Julius Kruttschnitt, Director of Maintenance and Operation of the Union Pacific System and the Southern Pacific Company. His statistics and argument, which are being published nearly in full in other pages of this paper, constitute a remarkable document, bold, scholarly and unanswerable.

In 1898 and 1899, after exhaustive investigation, a joint commission of the Senate and House of Representatives reported that the railway mail pay was not excessive, and that the pay for railway post office cars should not be reduced. Nevertheless, by acts of Congress passed in 1906 and 1907, the railway mail pay was reduced 3½ per cent., and the railway postal car rental was reduced 16 per cent. By successive orders of the postmaster general the postal car rental and the railway mail pay were further reduced. Perhaps the most indefensible reduction was made by order in this way: The law prescribes that the weighing of mails for the purpose of fixing rates shall be done "not less frequently than once in every four years." The department takes the limit and weighs only once in four years. The tonnage increases something like 6 per cent. a year, so that by this trick the railways receive pay for something like 12 per cent. less than they carry.

From 1898 to 1907 the price of labor increased 28 per cent., the price of commodities increased 38 per cent., train-mile costs increased 54 per cent., average freight-train tonnage increased 58 per cent., freight-train earnings per mile increased 58 per cent.—and all this while the freight ton-mile rate remained nearly stationary, increasing only 1 per cent. in nine years. Nevertheless, during the same period the railway mail pay per ton-mile was arbitrarily decreased 15 per cent. It is easy to see that the increase in train-mile operating expenses was not wholly due to heavier loading; it was largely due to the heavy increases in the cost of labor and materials.

The standard railway postal car of a few years ago was 60 ft. long, weighed 80,000 lbs. and cost about \$5,500; the present standard 60-ft. car weighs over 100,000 lbs. and costs 40 per cent. more. The new standard steel postal cars weigh 108,000

lbs. and cost over \$9,000. Specifications are made by the government. There are also 40-ft. R. P. O. cars, and the average weight of mail in the United States per equivalent full R. P. O. car is a trifle over two tons. The ratio of paying to dead load is 1 to 21.7. Assuming that a passenger weighs 150 lbs., the average rate of dead to paying load in all classes of passenger cars is the same as the ratio for R. P. O. cars. For freight cars the ratio is 1 to 1.1. But the earnings per gross ton-mile are: from mails .438 cents, from passengers .805 cents, from freight .369 cents.

The study of the relative cost of mail, passenger and freight service is a thorough one. It is interesting and even ingenious in its method of division of expenses. The Interstate Commerce Commission reports are largely relied on, but where they are deficient for the purpose, the more complete statistics of the Union and Southern Pacific are made available, and are invaluable. Indeed, it seems proper and no more than fair to say here that this system was established by the veteran statistician and accounting officer, William Mahl, who served through Mr. Huntington's administration, and is still Comptroller of the Harriman lines.

It is shown that the railway mail service is done at a cost, not including taxes and interest, of 96 millions, with an income of 48 millions and an operating expense of 200 per cent.; that the other passenger-train business is done at a cost of 677 millions, with an income of 622 millions and an operating ratio of 109 per cent. The freight business of the country is done at a cost of 974 millions, with an income of 1,823 millions and an operating ratio of 53 per cent.

The computations show that each passenger train hauls an average of .43 of a mail car, giving an income of 9.4 cents per mile; while each freight car run, loaded or empty, earns 10½ cents a mile. The proportion of dead weight of the mail car is 20 times that of the freight car, but its ton-mile earnings are only 13 times as much. There is still another way of expressing this fact: The average number of cars in each passenger train handled in the United States is 3.95, of which mail cars constitute 11 per cent.; but 11 per cent. of the average earnings of a passenger-train mile is 13.8 cents, while the mail pay is only 9.4 cents. The methods of conducting passenger traffic are largely, and mail traffic are entirely, beyond the control of the companies as to cost, and this cost has been steadily increasing. The deficit, as shown, is made up by economies in larger capacity cars and larger engines, which are entirely within the control of the companies. Mail-train speeds are continually increasing. Mr. Kruttschnitt finds an average yearly increase during the past 25 years of more than a half of 1 per cent. He shows from statistics in his own company the enormous percentage of accidents and losses due to high speed and enumerates the other elements of increased cost. He finds that high-speed passenger trains constitute the most unprofitable business in which railroads are engaged.

The transportation of railway mail clerks is considered. Figured at two cents a mile, the transportation of clerks in R. P. O. cars amounts to \$8,600,000 a year, nearly double the rental which the railways receive for these cars. On a similar basis the value of transportation furnished clerks in apartment cars is an additional four million dollars. A scandalous situation is boldly stated in the following paragraph:

"The post office department issues annually about 600 traveling commissions to post office inspectors and other postal officials, and requires railway companies to honor such commissions for free transportation on all trains on all lines on which mails are carried. In some cases these commissions are issued to government officers whose official duties are in no way connected with the transportation of mails on railways. The railways have no control whatever over the issuance of these commissions and cannot even secure from the post office department a list of them, the department holding that the list is confidential. These commissions are frequently

used for personal travel, in violation of the rulings of the Interstate Commerce Commission. In brief, the post office department in effect arbitrarily issues about 600 annual passes over each mail carrying railway in the United States, which is equivalent to about 200,000 annual passes."

The appearance of Mr. Kruttschnitt's argument is well timed for the reason that the department is calling upon heavy mail carrying roads for data on this subject. Such investigations are costly; moreover, it is almost impossible to obtain results that are thorough and complete except in corporations with such a system of statistics and accounting as Mr. Kruttschnitt enjoys.

#### THE COMMISSION AND JOBBING CENTERS.

The Interstate Commerce Commission is having as ill success in satisfying rival commercial centers with its adjustments of rates as the railways always have had. In its decision in the Missouri river Jobbers' case (Burnham-Hanna-Munger Dry Goods Co., et al., v. C. R. I. & P., et al.) the Commission laid down the principle that a rate for a through haul should ordinarily be less than the combination of two or more local rates over the same lines, and in accordance with this principle ordered the proportional class rates from the Mississippi to the Missouri river on goods moving from the eastern seaboard to be made lower than the local rates from river to river. The jobbers at the seaboard and at Missouri river cities rejoiced over the decision while those at Chicago, St. Louis and other immediate points groaned under it; for it tended to give the jobbers at the seaboard and at the Missouri river a substantial relative advantage over their competitors at intermediate cities in competing for business in Trans-Missouri territory.

It was pointed out at the time (*Railroad Age Gazette*, Sept. 18, 1908, page 938) that if the principle laid down in this case should be applied in later decisions to the rates on goods moving from eastern and central jobbing centers to towns *beyond* the Missouri river, the jobbers at Kansas City, Omaha and St. Joseph would lose a great deal more by these later decisions than they could ever gain by the proceeding that they won. The Commission now has applied this principle. It is in the case of George J. Kindel v. New York, New Haven & Hartford, et al. Heretofore the through rates to Denver from eastern points have been the sums of the rates to the Missouri river and the local rates beyond; the first class rate from Chicago to the Missouri river being 80 cents, and the rate from the river to Denver being \$1.25, the Chicago-Denver rate has been \$2.05. In the Kindel case the Commission orders the roads to make through rates from Chicago and St. Louis to Denver that shall be lower than the sums of the locals; fixing, for example, a through Chicago-Denver first class rate of \$1.80, as compared with the combination on Kansas City of \$2.05. The jobbers at Kansas City, Omaha and St. Joseph have extinguished the bonfires that they started when they got the news of the decision in the Burnham-Hanna-Munger case, and are now holding meetings and putting on their war paint preparatory to attacking the decision in the Kindel case. For this last decision gives to Chicago, St. Louis and Denver the same relative advantage over the Missouri river cities that the earlier decision gave to the Atlantic seaboard and Missouri river cities over Chicago, St. Louis and other intermediate points. Heretofore a Chicago jobber who wanted to sell goods in Denver has had to pay exactly the same rate for the through haul to Denver that the Kansas City jobber paid when he shipped goods from the factory at Chicago, broke bulk at Kansas City, and then reshipped. On the basis fixed by the Commission the Kansas City jobber—taking a first class shipment as an example—will have to continue to pay the present rate, \$2.05, while the Chicago jobber will have to pay only \$1.80. The jobber at Denver who buys goods in Chicago and St. Louis also will be

enabled by the reduction in his rates to compete more successfully and in a larger territory, both east and west of Denver, against the jobbers at Missouri river points.

Yet the jobbers at Denver are as much dissatisfied with the decision as are those on the Missouri. For they see that their present advantage will be but transitory. The shippers at Denver wanted their city made a basing point; they wanted the rates from the East to points west of Denver made the sums of the local rates from the Missouri river to Denver and from Denver to the points farther west. This would have enabled them to ship goods from the East to Denver and reship them from Denver to points West—to Utah common points, for example—as cheaply as they could be shipped direct from eastern commercial centers to those points. But the Commission refused to make Denver a basing point, and the Denver jobbers sorrowfully admit that a logical application of the principle on which the case turned will make through rates from the East to Utah lower than the combinations on Denver. The Denver Chamber of Commerce has adopted resolutions denouncing the decision, and Mr. Kindel, who, in winning this battle, has lost a campaign, is throwing verbal brick-bats at the Commission and threatening to have its members impeached.

The Commission is in the same predicament in which railway traffic managers repeatedly have found themselves after they have tried to adjust rates fairly and satisfactorily as between rival jobbing points. The jobber does not care much about the absolute amount of his rate; he cares a great deal about its relation to the rates of his competitors. In the adjustment of freight rates railway traffic managers usually have been merely expert arbitrators between competing shippers and communities. No matter what adjustments have been made there always have arisen loud outcries from most or all of the communities affected, each declaring that it had got the worst of it. No commercial center in the United States ever was satisfied with its rate adjustment. If there ever should be one, there would be good reason for suspecting that it was being unfairly favored. The constant complaints of shippers convinced Congress that the railways were discriminating, and the rate-making power was therefore given to the Interstate Commerce Commission. Now that the Commission has thrown itself into the breach it is receiving the same objurgations that the traffic managers always have received. Chicago and St. Louis complain that in the Missouri river decision the Commission discriminated unfairly in favor of New York and Kansas City. Kansas City, Omaha and St. Joseph complain that in the Kindel case it discriminated unfairly in favor of Denver, St. Louis and Chicago. And now Denver is weeping over the future.

If the Commission's theory of rate-making is not disturbed by the courts every application of it will cause reductions of the earnings of the railways; and who will be the gainers? Chicago and St. Louis gain by the Kindel decision, but they and every other jobbing center between there and the Atlantic seaboard lose by the Missouri river decision. New York, Kansas City, St. Joseph and Omaha gain by the Missouri river decision, but the Missouri river cities lose by the Denver decision; Denver gains by the Kindel decision, but will ultimately lose to Chicago, St. Louis, Kansas City, Omaha and St. Joseph if similar decisions are later rendered. In the long run the chain of decisions which the Commission has begun must work to the detriment of the more westerly and to the advantage of the more easterly jobbing points.

Railway traffic men take the view that if the Commission's orders for reductions in through rates are upheld and enforced corresponding reductions in local rates inevitably will follow. In that event, of course, the relations between rates will not be permanently changed; there will be simply a general reduction at the cost of the railways. The Commission argues, on the other hand, that there need be no corresponding reductions in local rates. If there are not, the communities that think

themselves hurt by the Commission's policy are very apt to appeal against it to higher authority. Already the business men of Denver have telegraphed a protest against the principle on which the Kindel case decision turns, addressing it to one of the United States Senators from Colorado. It was from the first as certain as that night would follow day that rival commercial centers would be no better satisfied with adjustments of rates made by the Commission than they had been with adjustments made by the railways. It seems that when the results of appeals from the railways to the Commission do not satisfy shippers, we are to have appeals from the Commission direct to Congress. Is it not enough to have our tariff legislation a national scandal of selfish and corrupt trading and log-rolling between the business interests and members of Congress of different sections at the expense of consumers, without subjecting railway rate-making to the same evil influences and treatment?

#### HEAT TRANSMISSION IN BOILER TUBES.

In the introduction to his recent book on "The Locomotive," Vaughan Pendred says: "Unfortunately, the locomotive lends itself in many ways to mathematical treatment, but in practice this plays but a secondary part, principally because it does not always fit in with existing conditions." In his chapter on "The Boiler," he says: "Into a boiler we put water and take out steam, but of the inwardness of the process practically nothing is known. Things are taken for granted, and when phenomena present themselves which are out of the common we are told either that they have no real existence, that they are quite usual, or that it is not worth while to pursue the inquiry. A great deal has been written about the conductivity of boiler plates, but no one cares to inquire how or why the heat passes into the water or what it does when it gets there."

While all this may be true in respect to engineers in a general way, fortunately there are exceptions, the most prominent being some of his own countrymen, who have been earnest and enthusiastic searchers after the truth regarding the transmission of heat through boiler plates. We are indebted to British scientists and engineers for much of our theoretical and practical knowledge of the subject, and it has recently occupied a prominent place in the London engineering journals. Rankin's formula makes the rate of heat transmission directly proportional to the square of the difference in temperature between the two sides of the plate. The expression,

$Q = \frac{(T - t)^2}{160}$  which he proposed does not take account of the rate of circulation of the water or of the hot gases, but it was for a long time accepted, as it gave results agreeing closely with actual boiler performance as found in measured tests.

In 1874 Professor Osborne Reynolds presented his paper on the "Action of the Heating Surface of Steam Boilers," before the Philosophical Society of Manchester, in which he endeavored to deduce from experiments and theoretical considerations the law governing the transmission of heat in boiler tubes, and announced that it is nearly proportional to the rate of flow of the gases. In 1899 Professor John Perry further developed Reynolds' suggestion, and in his book on the steam engine he advanced his theory that the rate of heat transmission in a boiler tube is proportional (1) to the temperature difference of the gases and the metallic surface; (2) to the density of the gas; (3) to the velocity of the gas parallel to the metallic surface; and (4) to the specific heat of the gases at constant pressure. The relation between the heat transmitted per second per unit of heating surface, and the above four factors is expressed by the equation:

$$H = C p v (T_1 - T_s)$$

where  $H$  = the amount of heat transmitted.

$C$  = the specific heat times a constant.

$p$  = the density of the gas.

$v$  = the velocity of the gas parallel to the metallic surface.

$T_1 - T_s$  = the difference of temperatures of the gases and the water.

In discussing the efficiency of boilers, in the same book, Professor Perry remarks: "When a good scrubbing action is established on both sides of the tube wall there ought to be at least 10 times, and maybe 100 times, as rapid an evaporation per square foot of heating surface as has yet been obtained in any boiler." While nothing of this kind has since been realized, and boiler design has not been changed materially, yet this theory explains why the tube heating surface of locomotive boilers is so much more efficient than in other boilers of good design, where the gas velocity is not so high. Coming from such an eminent authority, it has stimulated other investigators, and heat transmission in steam boilers has recently been the subject of lively discussions in the leading columns of London *Engineering* and *The Engineer*. In the numbers for Feb. 5 and 12, 1909, *Engineering* contains an extensive paper on the "Laws of Heat Transmission in Boilers as Deduced from Experiment," by Dr. John T. Nicholson, Professor of Mechanical Engineering in the University of Manchester. This paper reviews the principal experiments and theories of previous investigators, and gives the results of tests made with a large boiler where the gases were forced past a restricted passage in the heating surface so as to attain velocities much higher than usual. The author states that the amount of heat transmitted was about eight times the rate per hour per square foot of heating surface as is found in ordinary practice, and it was a specific demonstration of the law that the rate of heat transference from a gas through a plate is directly proportional to the speed of flow of the gas.

The leading editorial in *Engineering*, February 5, 1909, on "Steam Boiler Design," discusses Dr. Nicholson's paper, principally with reference to the effect of a knowledge of this law of gas flow upon boiler design and says:

"Not one designer in a hundred ever bothers himself about any theory of heat transmission. Boilers are now so thoroughly standardized that the proportions of heating surface, grate area, flue area and draft, have become little more than a question of following the teachings of experience. This may not be scientific, but like most of the habits of engineers, it is the expression of opinions arrived at after years of practical experience, and as such is entitled to every respect. The important point is not whether these formulas are right or wrong,—for nobody uses them in designing boilers,—but whether boiler practice might be improved by increasing the speed of the gases. The advantages of rapid circulation have been known for years and engineers have done their best to keep the water in rapid motion and to scour the heating surface well with hot gases. Possibly they have not gone far enough in either case, but they have done practically as much as natural means could effect and perhaps as much as is commercially practicable."

A more definite statement can be made with respect to the tendency of boiler practice in America. The enormous power developed by high speed turbines has made such a demand for large boiler capacity that engineers are no longer satisfied to supply sufficient heating surface to equal 15 sq. ft. per boiler horse-power and use ordinary draft and methods of firing, but are now obtaining a boiler horse-power from less than 5 sq. ft., as the result of high chimneys or forced draft and the use of machine stokers which cause a more rapid flow of gas through the tubes.

Heat transmission is considered at length by Lawford H. Fry in an article on "Combustion and Heat Absorption in Locomotive Boilers," in London *Engineering*, February 19, 1909. This is an extension of his study of the boiler performance in the St. Louis locomotive tests and subsequent ones made on the plant at Altoona. Mr. Fry's first paper related to combustion and heat balance in locomotives, and it was read at a meeting of the Institution of Mechanical Engineers, March 27, 1908.

Further reference should also be made to the experimental work and discussion of this subject by American engineers.

In connection with the stationary tests made at St. Louis by the Steam Engineering Division of the United States Geological Survey, it was found desirable, for the sake of better boiler construction and operation, that the factors which influence the rate of heat transmission by convection be more thoroughly known, and an investigation of the subject was made by the use of a special apparatus consisting of a small multitubular boiler, an electric furnace, a surface condenser and a steam ejector for producing draft. These tests demonstrated that there is a critical velocity of gas flow at which for any initial temperature the true boiler efficiency curve becomes horizontal, and beyond the point of critical velocity the rate of heat absorption by convection in boiler tubes is nearly a straight line function of the velocity of the gas. Experiments with the same apparatus with different sizes of tubes showed that increasing the diameter of tubes decreases their efficiency as heat absorbers, and increasing their length beyond a certain size decreases their efficiency.

These experiments were made under the direction of Professor L. P. Breckenridge of the University of Illinois, and in his "Study of Four Hundred Steaming Tests. Bulletin No. 325. United States Geological Survey," he devotes 52 pages to a very interesting treatment of the subject of heat absorption and boiler efficiencies.

Discussing the locomotive boiler more particularly, at a recent meeting of the Western Railway Club, Professor Breckenridge said:

"Much of the good performance of the locomotive boiler is due to the rapid sweeping flow of the hot gases through the tubes. Every ton of coal burned discharges about 20 tons of gas at a high velocity through the tubes, and this sweeping action of the gas is one reason why the locomotive has performed so well under conditions which are not altogether best for economical performance. The influence of gas velocity will have a larger effect on heat transmission than the velocity of the water current on the other side of the tube, and in about the same proportion as the specific heats of the gas and water. It is clearly evident that any boiler which is to give the maximum rate of heat transmission, greatest capacity and perhaps therefore the highest commercial efficiency will be one with a very high gas velocity passing over the inner tube surface and a high water velocity passing over the outer tube surface. A very large part of the heat imparted to the water in a locomotive goes directly by radiation to the plates of the firebox and the above remarks have no bearing upon this part of the heat transmitted."

In a slow gas current through a tube there is a tendency to form a film of cool gas next the soot or rough metal surface of the tube. Now, gas is a very poor conductor of heat, and if we depended on its conduction the process of transferring heat from the moving gas to the adherent film and through it to the tube would be very slow indeed. The only quick way of getting heat through is to dislodge the cold adhering film and replace it by hot gas. Thus it is that high velocity of gases along the heating surfaces is an important factor in heat absorption. It is this dislodgement that makes a boiler respond in amount of steam made to any reasonable demands put on it.

The important conclusions to be drawn from the above are: First, that the tube-heating surface in modern large locomotive boilers is often larger than necessary to properly absorb the heat from the furnace, and some improvement would be made if fewer tubes were used and larger water spaces provided for a more rapid circulation of water. The H7 consolidation locomotive of the Pennsylvania Railroad, with 24-in. x 28-in. cylinders and 76 $\frac{3}{4}$ -in. boiler, contains 508 tubes, while consolidations built since by this company, with the same size cylinders and boiler and larger driving wheels, have only 465 tubes; second, something further should be done in the direction of accelerating the water current about the tubes, and especially in the water legs of the firebox; third, there is little change in the rate of evaporation with higher rates of combustion so far as heating surface is concerned, as the principal loss is due to sparks and unconsumed fire drawn through the tubes; fourth, higher rates of combustion may be obtained by the use of larger grates and automatic stokers. By obtaining higher gas velocities in this way the boiler capacity can

be largely increased without increasing the tube-heating surface, and the large grate, combined with a brick arch, should keep down the spark loss; fifth, scientific investigators should be encouraged to continue their study and experiments connected with boiler phenomena because all new contributions to our knowledge of the subject, which help to explain those phenomena, must eventually result in improved boiler operation and improved design.

#### NEW YORK CENTRAL & HUDSON RIVER.

With earnings from freight 14 per cent. less in 1908 than in 1907, and passenger earnings 7 per cent. less, the New York Central & Hudson River had net earnings of \$19,184,905, as compared with \$19,102,707 in 1907. This remarkable result is directly due to increased efficiency and economy in handling business resulting from past expenditures for improvements and betterments.

The New York Central, although slow in waking up to the fact that terminal and yard facilities were the limiting factors in the economical handling of business, nevertheless did eventually realize this, and in the past seven or eight years have consistently developed these facilities. Between Buffalo and Albany the Central is a six-track railway, since the main line, four tracks, and the West Shore, two tracks, are operated under the same division organizations. Detouring connections have been made when necessary, notably at Churchville and at Schenectady, so that freight may take advantage of either the West Shore or the main line, according to which affords the lower grade and best facilities. Some idea of the present capacity of the Central to handle business may be gained from a study of the table showing miles of track. From Buffalo to Rochester the Central has nine tracks; from Rochester to Syracuse, eight tracks; from Syracuse to Rome, seven tracks; from Rome to Hoffmans, six tracks, and from Hoffmans to the Hudson river, seven tracks.

Since June 30, 1901, the management has spent for extraordinary improvements, additions and betterments and charged to income, \$23,730,042\*, and charged to capital account, \$40,587,718 and in addition to this has spent \$42,532,976 for improvements, additions and betterments to leased lines, part of which expenditure is borne by the lessor. This makes \$106,850,736 in all spent on the Central and its leased lines since 1901. While of course a considerable part of this money has been spent for additional tracks, a very large part of it has been spent directly for yard and terminal improvements. Between New York and Buffalo in the last 10 years the Central has spent \$6,265,000 for freight, yard and terminal improvements, including passing sidings, and \$3,820,000 for passenger, freight houses and yard improvements incident to the above improvements. Engine houses have been enlarged and the most improved methods of hostlering engines have been adopted. For instance, at various places, hot water wash-outs for locomotives are established. Although expensive in the first instance, they reduce the time required to wash out the boiler of a locomotive from seven hours to a possible one hour, and make a distinct saving in the life of boiler tubes by avoiding sudden cooling and reheating.

The present condition of the property is such that not only could the road economically handle the greatest amount of traffic that has ever been offered it, that is, the amount that was offered in 1906, but could probably handle a very much greater traffic with a minimum of congestion.

The electrical operation of the lines into New York city has had its second complete year of trial, and has apparently, at least as far as the rendering of adequate service is concerned, been justified. On few roads were the complaints about suburban service more bitter, and to some extent more justified,

\*This does not include \$2,853,718 in 1905, and \$2,923,340 in 1906, charged for renewals of equipment.

than on the Central out of New York two or three years ago. The present service is clean, both the Central and the New York, New Haven & Hartford operating their trains by electricity through the tunnel into the Grand Central station, and it is now dependable. Trains are on time and annoying delays are infrequent.

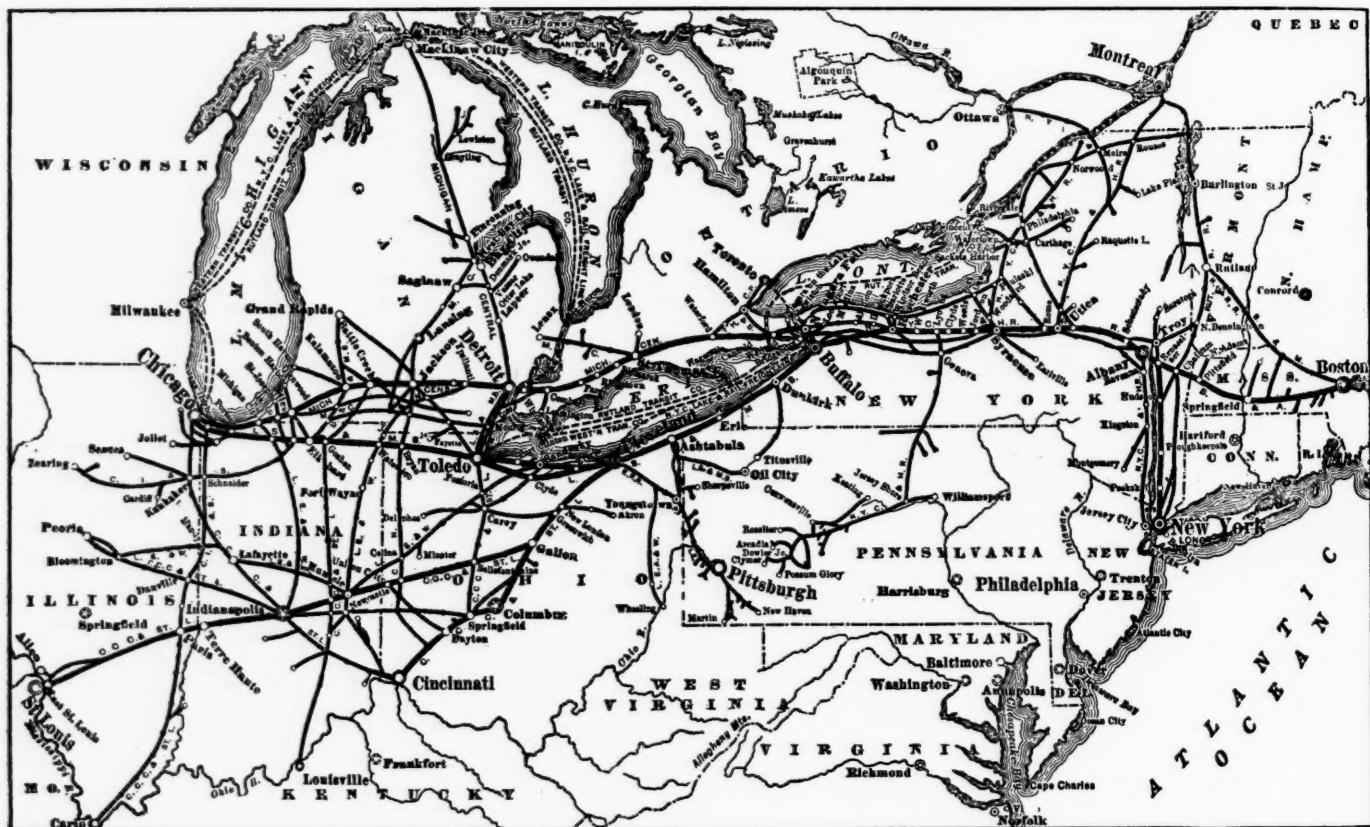
While improvements that are now under way, notably the building of the new station in New York city, are not completed and will require considerable sums, the greatest part of the extraordinary expenditures on property for the purpose of making the facilities for handling traffic commensurate with the traffic offered in a prosperous year have been made. Ninety per cent., it is estimated, of the extraordinary improvements between Buffalo and New York are now completed.

The results were necessarily not directly felt at first in the operation of the road, but last year for the first time the effect of these improvements was shown in net earnings. Gross

also shows the unit cost of repairs and renewals of equipment:

	1908.	1907.
Maintenance of way per mile.....	\$1,464	\$1,712
Repairs and renewals per locomotive.....	1,991	2,291
" " " " passgr car.....	618	837
" " " " freight car.....	81	77

The tons of revenue freight carried totaled 39,105,955 tons, or 18 per cent. less than in 1907, and the number of both interline and local passengers also decreased, the total number of passengers carried being 42,855,069, or 3,684,689 less than in the previous year. The earnings per ton amounted to \$1.28 last year and \$1.23 in the previous year, both the rate per ton per mile and the average length of haul increasing last year. The earnings per passenger, which amounted to 63 cents last year, were higher by one cent than in 1907, although the average number of miles one passenger was carried remained exactly the same, 36. The slightly higher rate received per ton per mile for freight is due probably to the fact that the loss in tonnage of merchandise and of the higher classes of freight.



The New York Central Lines.

The map shows in addition to the roads whose reports are reviewed in this issue, the smaller New York Central Lines, like the Lake Erie & Western and the Rutland.

earnings last year amounted to \$88,849,368, being \$9,519,692 less than in 1907, and, as has been pointed out, the greater part of this decrease in earnings came from a decrease in freight earnings. Operating expenses were \$65,419,085 last year, being \$10,384,249, or 14 per cent., less than in 1907. While the cost of maintenance of both way and of equipment decreased the great saving in expenses came from a saving of 16 per cent. in the cost of conducting transportation. This cost was \$38,750,355 last year, or \$7,236,548 less than in 1907.

As was to be expected, there were savings in such items as wages of enginemen and other trainmen due, at least in part, to a smaller business handled. There were also large reductions in the cost of such items as fuel for locomotives, which saving was due possibly as much to the improved condition of the property as to a smaller tonnage hauled.

The cost of maintenance of way and structures per mile of first, second, third, etc., track (switch tracks and sidings being counted half) is shown in the following table. The table

was not proportionately as great as in the commodities of lower grades.

The financial position of the New York Central & Hudson River has been strengthened during the year, so that while current assets amounted to \$42,757,677 in 1907, and included but \$4,633,022 cash, the current assets in 1908 amounted to \$50,722,575, and included \$16,018,182 cash. At the same time, current liabilities were reduced from \$27,516,371 in 1907 to \$20,238,221 on December 31, 1908. Dividends of 5 per cent. were paid in 1908 as compared with 6 per cent. in 1907, and the company had a surplus of \$144,277 last year as compared with \$365,909 in the previous year. And in comparing income in the two years it should be remembered that the principal subsidiaries of the New York Central paid smaller dividends to the Central as the majority stockholder last year than in 1907.

Not only the report for the calendar year 1908 but the monthly returns to the Interstate Commerce Commission indi-

cate the New York Central & Hudson River's ability to economically handle the increase in business that should come with a return of generally prosperous business conditions.

The following table shows the results of operation for the last two years:

	1908.	1907.
Average mileage operated . . . . .	3,781	3,782
Freight revenue . . . . .	\$51,206,547	\$59,406,447
Passenger revenue . . . . .	27,824,492	29,837,859
Total operating revenue . . . . .	88,849,368	98,269,060
Maint. way and structures . . . . .	10,768,284	12,462,047
Maint. of equipment . . . . .	13,420,283	14,823,631
Conducting transportation . . . . .	38,759,355	45,995,903
Total operating expenses . . . . .	65,419,085	75,803,334
Taxes . . . . .	4,245,378	3,463,019
Net revenue . . . . .	19,184,905	19,102,707
Gross income . . . . .	29,555,984	30,578,758
Net income . . . . .	9,075,877	11,083,829
Dividends . . . . .	8,931,600	10,717,920
Surplus . . . . .	144,277	365,909

#### LAKE SHORE & MICHIGAN SOUTHERN.

Like the camel, who can maintain himself on his accumulated surplus, the Lake Shore & Michigan Southern demonstrated last year that in crossing a desert year it could without detriment to the property spend for maintenance a very much smaller sum than in previous years and could get along without charging large sums to income account for betterments. During the eight years beginning with 1900, the Lake Shore charged to income account for additions and betterments, \$41,416,611. This is an average of \$5,177,076 per year. In 1908 there was charged for additions and betterments, \$1,292,276 only. Moreover, maintenance of way and structures, which cost \$6,328,638 in 1907, cost but \$4,909,069. The curtailment in permanent improvements resulted, the annual report says, in a correspondingly decreased maintenance charge. "The heavy improvement work in 1907, consisting of four-tracking the main line, rebuilding bridges, construction of new stations, etc., made necessary during that year heavy charges to maintenance to provide for changes to existing roadway and structures."

This sentence throws considerable light on the policy of the management of the Lake Shore in regard to what expenses are included in maintenance charges. The maintenance charges in the past eight years have been liberal in the extreme, and as was previously mentioned, an enormous sum has been charged to operating expenses for additions and improvements. This lump sum for the eight years amounts to \$27,410 per mile of line operated in 1908, and in addition, each year the Lake Shore was earning large surpluses. Out of these surpluses, \$15,556,082 was spent in the eight years, of which \$2,000,000 was to discharge floating indebtedness and the remaining \$13,556,082 for the acquisition of stocks of other companies, largely the Cleveland, Cincinnati, Chicago & St. Louis and the Pittsburgh & Lake Erie.

The bonds and stocks owned, having a par value December 31, 1908, of \$128,952,450, are carried on the balance sheet at \$89,718,447. The income from interest and dividends on bonds and stocks in 1908 totaled \$3,367,797. This is nearly 4 per cent. on the book value of the bonds and stocks, and since 1908 was a year of general depression, it may be taken as showing that the investment in stocks and bonds is fully able to take care of itself. If we subtract, therefore, this book value of stocks and bonds owned from the total capitalization of the Lake Shore we find that the road is capitalized at \$63,059 per mile of line operated in 1908. This figure (which does not take rentals into account) is only a little more than twice the amount spent per mile of line during the eight years 1900-1907 inclusive. The \$27,410 per mile spent during the total eight years is, as a matter of fact, 43.5 per cent. of the total capitalization, the cost of the book value of the bonds and stocks being subtracted from the par value of securities of the Lake Shore outstanding, it must be remembered.

The total operating revenue amounted to \$39,964,858 last year, a decrease of \$4,988,617 from the revenue in 1907. This

entire decrease is accounted for by the decrease in freight earnings. Earnings from this source were \$25,935,473, or \$5,176,009 less than in the previous year, a decrease of 17 per cent. The falling off in earnings from freight was rather less than commensurate with the falling off in tonnage carried. This tonnage totaled 26,224,406 tons last year, a decrease of 8,057,540 tons, or 24 per cent., from the figures for the previous year, while the earnings per ton increased, being 97.1 cents last year as compared with 89.2 cents in the previous year. The increase in earnings was due to a greater average haul, since the earnings per ton per mile averaged but 0.525 cents last year as against 0.533 cents in 1907. The average haul was 10.4 per cent. greater last year than in the previous year, the average in 1908 being 185 miles.

There was little change in the total passenger earnings, although the earnings per passenger per mile fell off from 1.967 cents in 1907 to 1.914 cents last year.

Total operating expenses, exclusive of additions and betterments, amounted to \$26,712,012, a decrease of \$2,832,336 from the expenses of 1907. Conducting transportation cost \$15,554,043, or \$796,868 less than in 1907. The cost of maintenance in general has already been mentioned. The cost per mile of maintenance of first, second, third and other tracks (mileage of switch tracks and sidings being counted one-half) and the cost per unit of repairs and renewals of equipment are shown in the following table:

	1908.	1907.
Maintenance of way, per mile . . . . .	\$1,686	\$2,141
Repairs and renewals, per locomotive . . . . .	1,711	1,770
"    "    "    " per passenger car . . . . .	735	874
"    "    "    " per freight car . . . . .	67	74

The balance sheet shows current assets of \$32,396,543 and current liabilities of \$8,840,037. This compares with current assets in 1907 of \$18,015,331 and current liabilities of \$13,049,548. The \$5,500,000 mentioned in the report of the Big Four as being a loan from the Lake Shore is shown on the balance sheet as a current asset in 1908 and not shown, separately at least, in 1907. Not only is the position of the Lake Shore strengthened in general as to current assets and liabilities, but cash charged the treasurer, which amounted to but \$961,127 in 1907, was increased in 1908 to \$14,418,965. Part of this increase presumably came from the sale of \$7,000,000 Chicago, Indiana & Southern bonds. This strong position as regards cash, together with a surplus of \$1,740,013 earned after the payment of 12 per cent. dividends in 1908, emphasizes once more the enormous equity of the New York Central stock in the earnings of the Central's most valuable subsidiary.

The following table shows the results of operation for the years 1908 and 1907:

	1908.	1907.
Average mileage operated . . . . .	1,511	1,520
Freight revenue . . . . .	\$25,935,473	\$31,111,482
Passenger revenue . . . . .	9,583,227	9,769,873
Total operating revenue . . . . .	39,964,858	44,953,475
Maint. way and structures . . . . .	4,909,069	6,328,638
Maint. of equipment . . . . .	5,422,114	6,044,155
Conducting transportation . . . . .	15,554,043	16,350,911
Total operating expenses . . . . .	26,712,012	29,544,347
Taxes . . . . .	1,424,201	1,300,875
Net earnings . . . . .	11,828,645	14,108,253
Gross income . . . . .	16,521,310	19,824,673
Net income . . . . .	8,968,269	12,379,830
Additions and betterments . . . . .	1,292,276	4,994,114
Dividends . . . . .	5,935,980	6,925,310
Surplus . . . . .	1,740,013	460,406

#### MICHIGAN CENTRAL.

Drastic reduction in expenses, especially in maintenance charges, was used by the Michigan Central to offset the reduction in earnings due to the bad year 1908. The charges for conducting transportation were reduced to a certain extent. They amounted to \$12,406,033 last year, being 8 per cent. less than in 1907, but it was primarily through the reduction of the charges for both maintenance of way and maintenance of equipment that the Michigan Central was able to show a larger net revenue in 1908 than in 1907. Maintenance of way

and structures, as a whole, cost \$3,061,375 last year as against \$4,991,923 in 1907. Repairs of roadway under the general head of maintenance cost \$1,722,708, or 33 per cent., less than in 1907, and repairs and renewals of bridges and culverts cost but \$206,119, 70 per cent. less than was spent in the previous year. In the same way the charges for maintenance of equipment were heavily reduced in 1908, but \$2,978,744 being spent on this account, a reduction of \$1,091,533, or 27 per cent., from the figures in 1907.

In detail, the charge for maintenance of way and structures per mile of first, second, third, fourth, and other track (sidings and switch tracks being counted half) is shown in the following table, together with the unit costs of maintenance of equipment:

	1908.	1907.
Maintenance of way, per mile .....	\$1,041	\$1,707
Repairs and renewals, per locomotive..	1,975	2,116
"    "    "    per passenger car	340	460
"    "    "    per freight car..	67	102

Total operating revenue amounted to \$24,918,488, being \$3,628,622, or 13 per cent., less than the revenue in 1907. Although passenger earnings suffered to a greater extent than was the case with either the Lake Shore & Michigan Southern or the Cleveland, Cincinnati, Chicago & St. Louis, it was in freight earnings that the Michigan Central, like the other Vanderbilt roads, suffered the most. Earnings from this source amounted to \$16,947,002, being \$2,979,802, or 15 per cent., less than in 1907.

The reduction in earnings came principally from a reduction in the volume of traffic moved. There were 14,347,464 tons of revenue freight carried in 1908. This is 13 per cent. less than the volume of freight in 1907, and the reduction was evenly distributed through the different classes of commodities, with the exception that the products of agriculture yielded a larger tonnage in 1908 than in 1907. Both the tonnage of grain, which amounted to 1,116,210 tons, and other mill products, which amounted to 256,591 tons, were considerably larger last year than the year before. The increases were 61,166 tons and 38,362 tons respectively.

The earnings per ton per mile on freight averaged 0.627 cents as against 0.641 cents in 1907, while the average haul was about the same in both years, 184 miles. Like all the other roads that have made reports for 1908, the Michigan Central had a considerably larger proportion of empty car mileage and a consequently smaller average train load in 1908 than in 1907. The train load being 379 tons as against 420 tons in 1907.

The total number of passengers carried increased by 169,240, totaling 5,150,871 last year, but since the average distance each passenger was carried decreased from 63 miles in 1907 to 60 miles last year, the number of passengers carried one mile was 3,606,002 less last year than in 1907.

The earnings per passenger per mile averaged 1.95 cents last year and 2.05 cents in 1907. Increased operating efficiency in the passenger department is shown by 55 passengers per train mile in 1908 as against 52 in 1907.

Dividends were reduced from 8 per cent. in 1907 to 6 per cent. last year, leaving a surplus of \$502,840 in 1908 as compared with \$230,325 in the previous year. There were sold during the year, \$3,825,000 4 per cent. first mortgage bonds of the Chicago, Indiana & Southern, and the company's cash capital was increased from \$1,318,774 in 1907 to \$3,683,940 last year.

Comparatively few roads could meet a falling off in earnings by such deep cuts in their maintenance charges without detriment to their rolling stock and their property, but, as has often been pointed out before, the Vanderbilt lines are in a situation rather different in this respect from that of most of the roads of the country, because their standard of maintenance has been very high in the past, so that one year's retrenchment should not seriously affect the condition of either the rolling stock or the roadbed.

The following table shows the results of operation for the years 1908 and 1907:

	1908.	1907.
Average mileage operated....	1,746	1,746
Freight revenue .....	\$16,947,002	\$19,926,803
Passenger revenue .....	6,168,190	6,541,103
Total operating revenue.....	24,918,488	28,547,110
Maint. way and structures..	3,061,375	4,991,923
Maint. of equipment.....	2,978,744	4,070,277
Conducting transportation..	12,406,033	13,503,987
Total operating expenses....	19,005,352	23,131,751
Taxes .....	1,105,694	1,008,776
Net earnings .....	4,807,442	4,406,583
Gross income .....	5,462,947	5,109,102
Net income .....	1,627,120	1,729,365
Dividends .....	1,124,280	1,499,040
Surplus .....	502,840	230,325

#### CLEVELAND, CINCINNATI, CHICAGO & ST. LOUIS.

The assertion of the Middle West that it did not feel the business depression of 1908 as did the rest of the country is to a certain extent borne out by the showing of the Cleveland, Cincinnati, Chicago & St. Louis last year. The Big Four holds somewhat the same position relative to the New York Central lines as the Pan Handle holds to the Pennsylvania system. The P. C. C. & St. L., however, runs as far west as Indianapolis only, and then turns north, while the Big Four extends west to St. Louis and southwest to Cairo.

Although there was a falling off in both freight and passenger business on the Cleveland, Cincinnati, Chicago & St. Louis, the decrease was not very sharp nor very severe. Total operating revenue amounted to \$24,621,661 in the calendar year 1908 as compared with \$26,447,804 in the previous year, the greatest decrease being in freight earnings, which totaled but \$15,711,941 last year. This is \$1,526,407, or 9 per cent. less than in 1907, and was caused both by a decrease in the tonnage carried and by smaller earnings per ton per mile. The decrease in actual business as shown by the number of tons of revenue freight carried amounted to but 4 per cent., being 17,361,766 tons carried in 1908 as against 18,130,351 tons in 1907.

Passenger earnings and business show proportionately rather slighter decreases, the total earnings from this source being \$6,908,326 in 1908, or \$218,723 less than in 1907, and the total number of passengers carried amounted to 6,721,878 as compared with 6,701,012.

Total operating expenses were reduced \$924,039, and amounted to \$5,390,137 in 1908. They nevertheless consumed a little over 78 per cent. of gross earnings as compared with 76 per cent. in 1908. This is an increase of \$332,371 in the cost of conducting transportation, which, by the way, includes most of the items under the heading traffic expenses, prescribed by the Interstate Commerce Commission and not shown separately in this report. These transportation expenses amounted to \$12,200,908 last year, the increase being accounted for through an increase in per diem balances due to decreased demand for cars on foreign roads and by increased cost of loss and damage. The latter was due, the report says, chiefly to the settlement of deferred claims, largely the result of congestion in the later months of the year previous, and the increase of fire claims as the result of this year's mid-summer drouth. The cost of both maintenance of way and of equipment decreased. The following table shows the cost per mile of first, second, third, and other track (mileage of switch tracks and sidings being counted one-half). It also shows cost, per unit, of repairs and renewals of equipment:

	1908.	1907.
Maintenance of way, per mile .....	\$916	\$1,220
Repairs and renewals, per locomotive ..	1,921	2,579
"    "    "    per passenger car	648	796
"    "    "    per freight car..	68	64

With these lower maintenance charges and slightly greater transportation costs, 49.55 per cent. of gross earnings goes to conducting transportation as compared with 44.88 per cent. in the previous year.

Notwithstanding the decrease in freight business, freight

train mileage totaled 6,983,206 miles last year as compared with 6,938,123 miles in 1907. Passenger train mileage, however, slightly decreased. Car mileage increased from 260,319,590 in 1907 to 267,302,854 miles last year, due entirely to an increase of 24,569,260 miles in the empty car mileage. Naturally the average train load decreased, being 383 tons last year as compared with 422 tons in the previous year.

The balance sheet of the Big Four lacks interest, first, because being one of the New York Central lines it is not very full and the items given are not explained in other parts of the report, and secondly, because since it is under the wing of the Central, its balance sheet of itself shows only one side of the general financial position of the so-called Vanderbilt roads. The company on December 31, 1908, had current liabilities of \$11,037,448, with current assets of \$6,278,819. This compares with December 31, 1907, as follows: Current liabilities, \$11,623,139, and current assets of \$6,356,314. The supply of cash was slightly larger on December 31, 1908, than in the previous year, and under current liabilities there are but \$4,152,398 wages and supplies due as compared with \$6,742,683 in 1907. On the other hand, bills payable have increased. The loans and bills payable are carried on the 1907 balance sheet at \$3,013,990, while on the 1908 balance sheet the bills payable are divided up, \$5,500,000 being due the Lake Shore & Michigan Southern; \$112,500 due the Dayton & Union, and other bills payable amounting to the nominal sum of \$3,425, making in all \$15,615,925 bills payable.

Altogether the Big Four came through the 1908 year remarkably well. It spent considerably less for additions to the property, improvements and new equipment, the sum being \$3,210,932 last year as compared with \$8,096,403 in 1907, but the expenditures for improvements of the Vanderbilt roads have been heavy in the past, and the amount charged last year to capital account and spent for improvements was probably ample to keep the property up to standard condition.

The following table shows the results of operation for the years 1908 and 1907:

	1908.	1907.
Mileage operated .....	1,982	1,983
Freight revenue .....	\$15,711,941	\$17,238,348
Passenger revenue .....	6,908,326	7,127,049
Total operating revenue.....	24,621,661	26,447,804
Maint. way and structures .....	2,611,392	3,432,738
Maint. of equipment.....	3,801,196	4,209,998
Conducting transportation.....	12,200,908	11,868,437
Total operating expenses.....	19,231,524	20,133,629
Taxes .....	894,376	842,892
Net earnings .....	4,495,761	5,471,283
Gross income .....	4,633,167	5,657,827
Net income .....	708,779	1,973,217
Dividends .....	500,000	1,911,689
Surplus .....	208,779	61,528

## Letters to the Editor.

### THE USE OF MODERATELY SUPERHEATED STEAM.

Montreal, March 22, 1909.

TO THE EDITOR OF THE RAILROAD AGE GAZETTE:

The article by Lawford H. Fry in your issue of March 5, page 459, on the use of moderately superheated steam draws conclusions favorable to moderate superheat which are not, I consider, entirely justified.

Mr. Fry's results depend on two deductions, the first with reference to the efficiency of the boilers, the second to that of the engine. Compared with a normal boiler having an efficiency of 60 per cent., Mr. Fry deduces an efficiency of 62.1 per cent. for a boiler having a drop of temperature of 100 deg. in the gases passing through the superheater, and without wishing to question this figure, I would simply call your attention to its being a remarkably efficient case of heat transference and possibly a maximum result. The total heat of steam at 140 lbs. pressure from 60 deg. is 1164 B.t.u., which would represent the heat transferred with an efficiency

of 60 per cent. so that with an efficiency of 62.1 per cent. with the increase obtained entirely from the action of the superheater, 1204.7 B.t.u. must be transferred per lb. of steam. I presume that the specific heat of steam has been taken at 0.52 between 400 deg. and 650 deg., so that if the superheat obtained is 40 deg. this would account for 20.8 B.t.u., leaving 20 to be accounted for by evaporation of the entrained water. At 140 lbs. pressure the latent heat evaporation is 860 B.t.u., so that this would correspond to 2.3 per cent. of water, which would be rather high, and I therefore consider that it would be more reasonable to give the superheater credit for 40 deg. superheat, which is, I believe, about the highest that has been claimed for the front end superheater, and say 1 per cent. of moisture, which would reduce the efficiency from 62.1 per cent. to 61.5 per cent. I do not wish to question Mr. Fry's figures, but in view of the variations in temperature which we have found in different parts of the smoke-box of ordinary engines, I do not believe it wise to accept an increase in boiler efficiency in excess of the effects obtained.

I cannot agree at all with the necessity of a smoke-box temperature of 800 deg. for the high superheat boiler. Even admitting for the sake of argument that the gases pass out of the superheater tubes at this temperature, giving a final temperature difference of 150 deg. between the gases and the steam for both types of apparatus, Mr. Fry has neglected the fact that the larger proportions of the gases pass through the evaporation tubes, and would therefore be discharged at 650 deg., following the reasoning in his article. Take the case of an engine having 244 tubes 2 in. diameter or say 1 1/4 in. inside, and 22 superheater tubes 4 1/2 in. inside, contracted to three inches at the flue sheet. Figuring the area of the large part (less the four 1 1/4-in. pipes) the area through the superheater tubes is 29 per cent. of the total, while if figured at the flue sheet end it is 21 per cent. of the total. Taking 25 per cent. as an average discharge at 800 deg. and 75 per cent. at 650 deg., the average temperature would be 690 deg., and the B.t.u. discharged 15 per cent. of the coal fired. The boiler efficiency has thus dropped to 59 per cent. in place of 56.7 per cent. as calculated, and the net result is therefore that in place of the low and high superheater boilers having efficiencies of 62.1 per cent. and 56.7 per cent. respectively, they should properly have efficiencies of 61.5 and 59 per cent. respectively; in other words, in place of being as 100 to 91.5 they are as 100 to 96.

Mr. Fry has, however, neglected a further and far more important consideration, namely, that the efficiency of a boiler is a function of the work it is doing. This was shown most distinctly at the St. Louis test, and it is evident that the only proper comparison of two engines can be on the basis of equal rates of work developed.

The above estimates are based entirely on equal weights of coal burned per hour, whereas the thermal consumption of the three engines is given by Mr. Fry as 100, 89 and 79 respectively. For equal rates of work or for equal horse power therefore the high superheat boiler is only requiring 79 per cent. of the B.t.u. required by the saturated steam engine per hour, and the consequence is that all losses are correspondingly reduced and this factor alone will more than overbalance the losses in efficiency shown above.

The general results of the St. Louis tests showed that the relation between the equivalent evaporation per pound of dry coal (which I will call "E") and the equivalent evaporation per sq. ft. of heating surface per hour (which I will call "Q") could be fairly represented by a line having the

Q  
equation  $E = 13 - \frac{Q}{2}$ . Now, E is proportional to the

efficiency of the boiler and Q to its thermal consumption or the B.t.u. per hour required to do a given amount of work, and while the contestants given may be modified slightly,

they are substantially correct. As the coal used averaged 14,000 B.t.u., an efficiency of 100 per cent. corresponds to an equivalent evaporation of 14.5 lbs. and 60 per cent. efficiency to one of 8.7 lbs. For  $E = 8.7$  lbs.,  $Q = 8.6$  lbs., and if on account of the increased efficiency of the engine this is reduced in the ratio of 100 to 89 and 79 respectively,  $Q$  for those consumptions becomes 7.75 and 6.9, the corresponding evaporation (E) 9.13 and 9.55, and the corresponding efficiencies 62.9 per cent. and 65.8 per cent. respectively. If these efficiencies are corrected as above by adding 1.5 per cent. to the low superheat boiler and deducting 1 per cent. from the high superheat boiler the final efficiencies for the three boilers are 60 per cent., 64.4 per cent. and 64.8 per cent. respectively, but it must be understood that these results are dependent on the engine efficiencies that have been assumed being obtained.

Mr. Fry has quoted a steam economy on the saturated steam engine of 12.5 per cent. for the low superheat and 30 per cent. for the high superheat engine, these figures based on pounds of steam per i.h.p. hour. Taking B.t.u. the consumption is 27,900, 24,800 and 22,000 per horse power hour respectively, or as 100 is to 89 and 79, or about a 3 per cent. saving for the engines with low superheat as against 21 per cent. for that with high, and these are I believe much more closely the figures that will be obtained in service.

It is obvious that if the engine efficiency of the low superheat locomotive is less than that assumed its steam consumption will not be reduced and its boiler efficiency improved as I have outlined above, while on the other hand, in practice, the application of the smoke tube superheater somewhat reduces the amount of heating surface; and this reduction should be allowed for in the estimate of boiler efficiencies I have made in which I endeavored to follow the method outlined by Mr. Fry. This reduction in heating surface amounts to about 15 per cent. and if  $Q$  is corrected for this the equivalent evaporation E becomes 8.95 and the boiler efficiency 61.6. Correcting this for the higher temperature of the gases passing out of the superheater tubes would leave the boiler efficiency of this engine at 60.6 per cent. and the result would be that the thermal efficiency of 21 per cent. should be found to be the saving. It is interesting to note that this figure has been somewhat exceeded on the Canadian Pacific in service, and that this estimate for the high superheat engine is therefore fairly justified, but it is evident that there may be a considerable difference in the results obtained from the low superheat engine, dependent chiefly on the efficiency that is actually obtained from a small amount of superheat in the cylinders.

H. H. VAUGHAN.

#### THE SPOKANE RATE CASE.

Oklahoma City, Okla., March 27, 1909.

TO THE EDITOR OF THE RAILROAD AGE GAZETTE:

I have just read the editorial on "The Spokane Rate Case" in your issue of March 12, and wish to make one or two comments.

You say "but, as the Commission concedes, water competition is controlling at Coast Terminal points, and it would be pretty sure to force reductions to the coast ports corresponding to any made to intermediate points."

If water competition is controlling, why has it not already forced the rates to Pacific coast ports as low as possible, and if it has not done so does it not follow that there must be some understanding or combination between rail and water carriers?

Again, if the water competition is controlling, and business can profitably be handled to Coast cities for less money than has heretofore been charged, will not the decision simply result in all the consumers of the West securing reductions to which they are entitled: reductions which will supply them

with all of their necessities at a less transportation cost?

Further on you say, "Can rates be properly held to be inherently unreasonable on which the tariff moves easily, which are low as compared with other rates for similar service throughout the world, and for which much better service is rendered than ever before?" The day after the Galveston storm of September 8, 1900, fifty cents or even a dollar a box could readily be obtained in that city for Uneeda biscuit, but no sane man would say that that was a healthy trade condition, or one which it would be well to have indefinitely maintained.

Again you say, "What incentive will the management of a road have to seek to build up a large traffic by skillful adjustment of rates; to attract travel by giving the best and safest service; to reduce operating expenses by constantly experimenting with and adopting new and improved appliances, if all profits above a certain maximum, say four or six per cent., are to be appropriated to the public by means of rate reductions?" One may fairly reply with the question, What incentive would there be for a railway to use its best efforts to build up a great commercial metropolis upon the sea coast when it has to continually fight for its share of the business with water carriers? Often it has to take the business at rates inadequate to pay the cost of service, while at the same time maintaining a policy of rate making to otherwise well located points in the interior which discourages their doing any great amount of business and prohibits them from attaining any commercial importance.

If it has been hard for rail carriers to meet competition to Pacific coast points as against water transportation in the past, what will be the condition when the Panama Canal is finished and water transportation becomes a real live factor? It would seem to an ordinary business man that the sensible thing for the railways to do would be to encourage the building up of strong interior jobbing points over which they can retain control, and to which they can always maintain such rates as will be at least compensatory.

J. H. JOHNSTON.  
Traffic Manager, Oklahoma Traffic Association.

#### EFFECT OF FLAT WHEELS ON RAILS.

TO THE EDITOR OF THE RAILROAD AGE GAZETTE:

In the *Railroad Age Gazette* of January 8 the discussion of Messrs. Geo. L. Fowler and E. L. Hancock of my article, on The Effect of Flat Spots, I consider more due to a misunderstanding of the article than a valid criticism of it.

Mr. Fowler calls attention to the fact that a flat spot delivers a substantial blow at speeds above five miles an hour as antagonistic to the results arrived at, and suggests that both writers based the computations on gravity, from which I can only infer that Mr. Fowler did not read carefully either the conditions assumed or the results stated in my article. The conditions assumed are very largely those outlined by Mr. Fowler, but on account of the weight below the springs supported by the wheel being considered as dropping with the wheel the acceleration taken is ten times that of gravity in place of 17.7 times as taken by Mr. Fowler. The speed at which the flat spot strikes its maximum blow would not, however, vary directly as the acceleration, but as its square root, as shown in Section 1 of Mr. Spilsbury's analysis; while if the decreasing action of the spring is taken into account it would be somewhat less. As a matter of fact, for any ordinary flat spot the actual drop of the wheel is so small that without introducing any appreciable error the action of the spring may be taken as constant.

With regard to practical considerations of the irregularities in track, rolling of car, etc., it is true that these enter into the question and cannot easily be allowed for, but as I understand the importance of this question the information desired

is the order of magnitude of the blow delivered by flat spots with the existing limitations; and I consider that the results arrived at in Mr. Spilsbury's analysis have determined this to be of a reasonable and safe amount as opposed to the highly dangerous magnitudes arrived at in Mr. Hancock's original calculation. The blow will be substantially increased or decreased in the same way as the pressure between the rail and a wheel without a flat spot varies from the same causes, but this does not lead us to neglect the weight on the wheel as a measure of the pressure on the rail, and I consider that the kinetic effect of the wheel striking the rail is determined by Mr. Spilsbury with accuracy with proper figures for the various quantities, as the pressure between the wheel and the rail is when the weight on the wheel is known, provided, of course, that no actual error is shown in the calculation, which so far has not been the case.

I do not quite understand Mr. Hancock's position, wherein he states that it is more rational to consider only the mass of the rotating parts as concentrated at the center of the wheel, as to whether he intends to supplement this with the action of the springs. If this be the case he has abandoned his original condition and there is simply a change in the assumptions I have made. As an extreme condition, let us take the weight of the wheel and one-half the axle as the rotating weight, say 1,100 lbs.; take the same total weight per wheel as before, and assume that the springs carry the entire remaining weight. The resulting maximum striking velocity (see result D) is 4.6 ft. per second in place of 3.8. In other words, there is a weight of 1,100 lbs. striking at 4.6 ft. per second against one of 1,600 lbs. at 3.8 ft. per second as originally assumed. The kinetic energy is 363 ft. lbs. against 358 in the latter.

There is no assumption of an upward force in Mr. Spilsbury's analysis; when a body of mass  $M$  is rotating around a center at a distance  $R$  from its center of gravity the centrifugal force as it

is generally termed is  $\frac{M V^2}{R}$  and this is the force referred to

when the condition is postulated as in section 1 of the wheel turning around the leading edge of the flat spot.

I trust you will pardon these demands on your space, but I consider Mr. Spilsbury has supplied a correct and reasonable analysis of this important question and one that agrees with practical experience, and I feel that the discussions that have taken place would not leave an entirely correct impression.

H. H. VAUGHAN.

## Contributed Papers.

### RESULT OF FIRST ARBITRATION UNDER BOARD OF TRADE SCHEME.

It will be recalled that in the autumn of 1907 there were threats of an impending strike on British railways, in consequence of which the then president of the Board of Trade—Mr. Lloyd George—had some protracted negotiations with several of the railway chairmen and also with the representatives of some of the men's trades unions. The result was a scheme for conciliation and arbitration which provided for the formation of boards for each railway, consisting of representatives of the company and of the employees, to consider any question relating to rates of wages and hours of duty. The scheme further provided that questions which these boards were unable to settle were to be referred to a single arbitrator.

The London & North Western was the first company to complete the arrangements in connection with the scheme, and demands from most of the grades concerned in the working of traffic, numbering about 39,000 men, were considered by the newly-formed Conciliation Boards. The principal grades concerned were: engine drivers, firemen and cleaners, signalmen,

brakemen and shunters, passenger guards and platform porters, carriage cleaners, wagon examiners and greasers, permanent way men, goods staff, cartage staff.

Agreement, however, was found impossible, and reference was made to arbitration, and Sir Edward Fry was selected as arbitrator.

Sir Edward Fry sat at Euston station for eight days in December, 1908, and his award has now been published. The men's demands consisted of a general "All Grades National Program" for advances of pay and reduction of hours, which, if granted in their entirety, would have involved an extra cost of at least £750,000 yearly, equivalent to nearly 2 per cent. dividend on the company's ordinary stock of 42 million pounds. During the course of the arbitration proceedings the employees withdrew a large number of items on account of their being nearly or quite in accordance with the company's existing practice.

Under the award the men obtain benefits estimated at £70,000 yearly—a small proportion of what they claimed. Some of the most important claims put forward in the "National Program" were entirely disallowed by the arbitrator, as for instance: that an immediate advance of 2 shillings a week be given to all grades; that eight hours constitute the standard day for drivers, firemen, signalmen, passenger guards and brakemen; that a full week's wages be guaranteed; that overtime should be calculated for each day separately; that Sunday duty be paid for at a minimum of rate and a half; that the "bonus," "classification" and "trip" systems be abolished; that promotion be according to seniority.

The following is a precis of the principal points in the award:

#### LOCOMOTIVE DRIVERS, FIREMEN AND CLEANERS.

Minimum of nine hours' rest between two spells of duty, except in case of emergency.

Advance of 1s. 6d. per week to firemen employed on the new large engines.

Slight increased allowance to locomotive men stationed in the London district, without prejudice to the right of the company to advance the rents of their houses.

Slight reduction in scale of pay for cleaners.

#### SIGNALMEN.

Rate and a quarter for all overtime, and for all time worked between midnight of Saturday and midnight of Sunday: also an allowance when temporarily working in a higher paid cabin.

#### RAKEMEN.

A minimum of nine hours' rest, except in case of emergency. An allowance to men stationed at Willesden, without prejudice to the right of the company to advance the rents of their houses.

#### SHUNTERS.

Reduction in hours of men exclusively engaged in shunting to eight a day.

#### PASSENGER GUARDS.

Rate and a quarter for all time over standard hours. To be paid time and a quarter for Sunday duty, but the present system of paying the full day's pay for any spell of Sunday duty to be abolished and the duty and pay to be split up into quarter days as proposed by the company.

#### PLATFORM PORTERS.

To be paid at ordinary rate for Sunday duty in addition to weekly rate of pay, with a minimum of a quarter of a day's pay for each time of booking on duty. This clause not to apply to men finishing their ordinary week's work on Sunday morning or commencing their ordinary week's work on Sunday night. \*

#### PERMANENT-WAY STAFF.

Allowance when working in higher grade, for more than a day consecutively, of not less than the minimum rate of the higher grade.

#### GOODS STAFF.

Maximum working week, 72 hours a week, less three hours daily for meals and rest; of the three hours for meals and rest two to be successive.

Employees under 21 years of age not to be paid adult wages when not employed on adult work.

Rate and a quarter for all time over the standard week of 72 hours and between midnight of Saturday and midnight of Sunday. In regard to Sunday work an exception is made in the case of men finishing their week's work on Sunday, and not recommencing work until after a rest

of 24 hours, and also of men commencing their week's work on Sunday after 12 o'clock at noon, and after a preceding rest of 24 hours.

An advance of 2s. per week to all capstan men.

CARMEN, DRAYMEN AND LURRYMEN.

Maximum hours of work to be 60 per week, inclusive of one hour daily for dinner.

Rate and a quarter for all time worked over the standard week, and between midnight of Saturday and midnight of Sunday, with the same exception in regard to the latter as shown above for the goods staff.

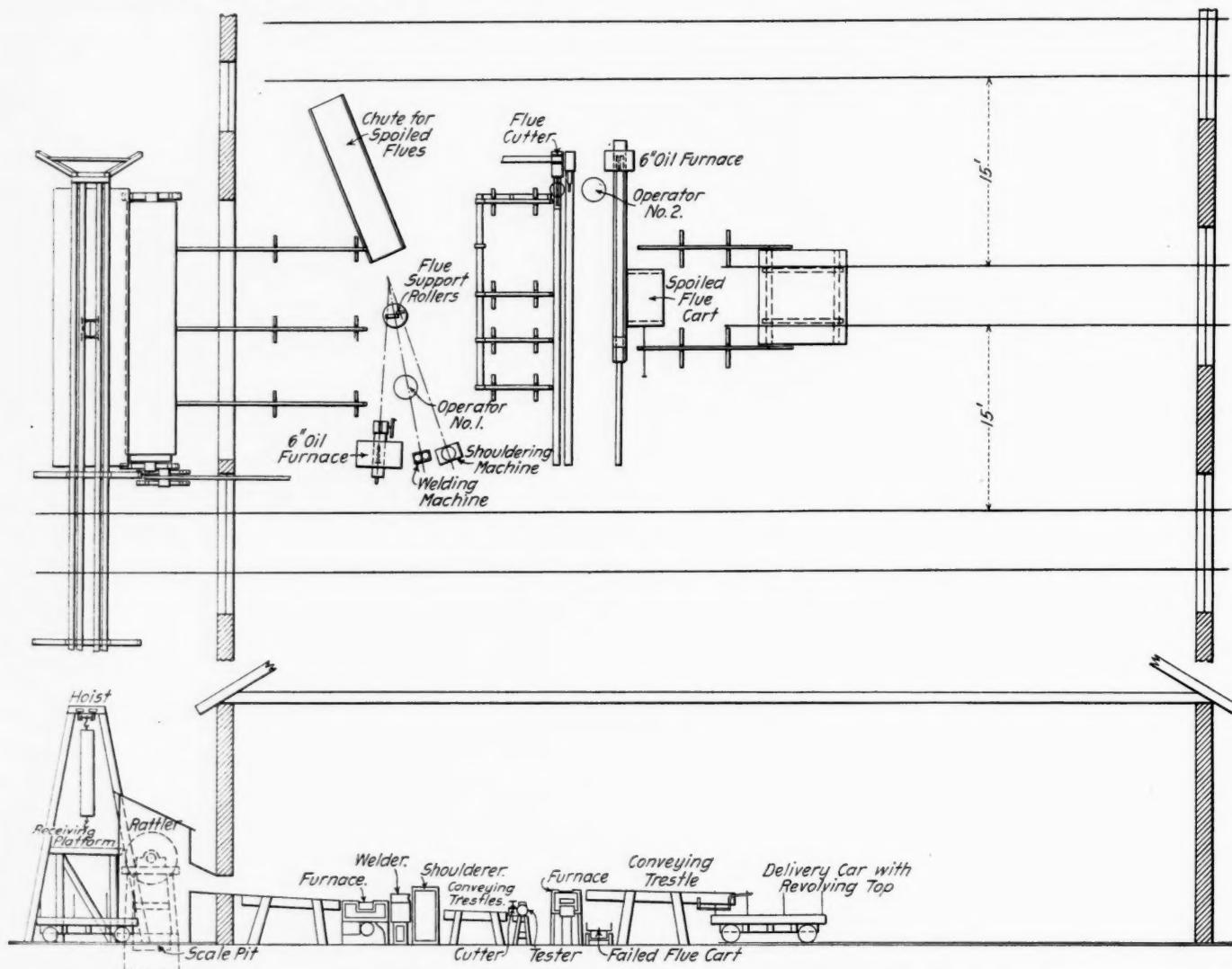
The award was to come into operation on April 1, 1909, and is binding until January 1, 1913.

#### HANDLING LOCOMOTIVE TUBES.

A flue shop recently has been installed in the Garrett, Ind., locomotive repair plant of the Baltimore & Ohio, which is turning out repaired boiler tubes at the rate of one a min-

so that the end of the flue, which is to receive the new safe end, will not need further attention in the way of trimming or cutting off before reaching the furnace at the welding machine.

The operator in the smokebox, who handles the cutting off machine, removes the flue with assistance from the operator in the firebox and pulls it out on to an inclined roller slide which delivers it immediately over and drops it automatically on to a flat car. All handling of the flue, outside of that necessary by the two operators in the flue shop, now ceases until the finished set of flues is returned on the car to the boiler to be reset. A small shop switching locomotive takes the car to the pneumatic hoist at the flue rattler. The flues are rattled wet or dry with the axis of the rattler barrel  $6\frac{1}{2}$  ft. above the floor of the shop, which permits the flues, when rattled, to roll into the shop over inclined trestles di-



Elevation and Plan, B. & O. Flue Shop at Garrett, Ind.

ute. A description of the manner in which flues are being handled and worked in this shop, which occupies a floor space only 25 ft. x 35 ft., in one corner of the boiler-shop proper, follows:

The work starts with the flue as it leaves the boiler enroute to the rattler. The track arrangement in the erecting shop is such that it is possible to push flue cars directly in front of each locomotive. When it is desired to renew a set of flues in the roundhouse, the locomotive is backed in, making it possible to bring a flue car close to the boiler, as is done in the erecting shop. The flues are then taken out of the boiler, being careful to see that they are not damaged when the beads are chipped off in the firebox with the air hammer,

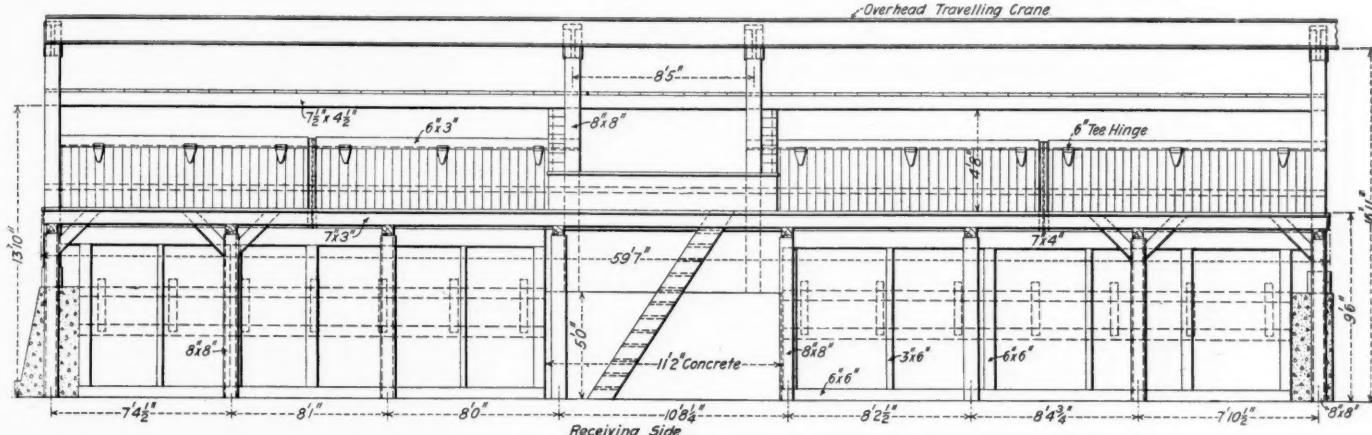
rectly up to the first operator, who stands in front of the furnace and the spreading, welding and shouldering machines. A two-portal furnace burning fuel oil in connection with fan blast air receives the flue in its first portal, where it is heated preparatory to spreading. The operator, in the meantime, has thrown a safe end, already scarfed (the flue is not scarfed) into the portal ahead of the flue.

The flue is now hot enough to spread. A spreading plunger, operated pneumatically, is placed at the proper angle directly under the furnace, and the flue, which is supported near its center throughout the first set of operations on roller supports, is lowered until it is in line with the spreader plunger and then clamped with a quick service vise. After the end of the

flue is spread, it is inserted into the portal which contains the safe end, now red hot, which is then bumped into the spread end, and the flue, with the safe end inserted, is placed in the second portal. While waiting a few seconds for the welding heat, the operator draws the next flue from the inclined rack and places it in the vacant portal, along with a safe end, to heat for the spreading operation. He then takes the other flue, which has reached welding heat, and passes it rapidly through the welding and shouldering machines. He then rolls this flue on another set of inclined trestles to the second operator, who stands at the opposite end of the flue.

On one side of the operator are the belt-driven cutting-off and hydraulic steam-driven testing machines, and on the other side he has a small fuel-oil furnace, directly over the spreading

cleaner is driven by an electric motor and arranged in a house, so that the tubes are delivered and removed to the cleaner by gravity, and no hand labor is required in lifting them. The tubes, as removed from locomotives, are loaded on a special car, which is moved to a track under a traveling crane. The entire load of tubes is hoisted by the crane and dropped on the receiving platform at the tube-cleaner house, from which point they are fed into the cleaner. After the tubes are cleaned they are discharged by gravity over an inclined door directly to a car which transfers them to the tube department in the boiler shop. The overhead traveling crane extends along the side of the storehouse and is used principally for handling heavy stores. The tube cleaner is located, so that this crane may be used for hoisting the tubes



Side Elevation of Tube Cleaner Building; Burnside Shops of the I. C.

machine, where he heats and spreads the flue to fit the larger hole in the front flue head. The flues, when cut off, are tested by a steam operated water ram and the spreading plunger is worked pneumatically. The flue is then thrown on to the inclined trestles from which it drops to the flue car, finished, and is ready, when the set is complete, to be hauled back to the boiler. All of the machines are adjustable so that flues from 10 ft. to 20 ft. long can be accommodated.

to the cleaner platform. The drawing shows the house arranged for two tube cleaners, with the motor drive at the center.

#### RAILWAY MAIL PAY.

BY JULIUS KRUTTSCHNITT,  
Director of Maintenance and Operation of the Union Pacific System  
and the Southern Pacific Co.

The question of compensation to the railways of the United States for carrying the mails has been under review before Congress at different times during the past ten years. The subject was exhaustively investigated by a Joint Commission of the Senate and House of Representatives in 1898 and 1899, which reached the following conclusion after full consideration and taking of a mass of testimony on all sides of the question:

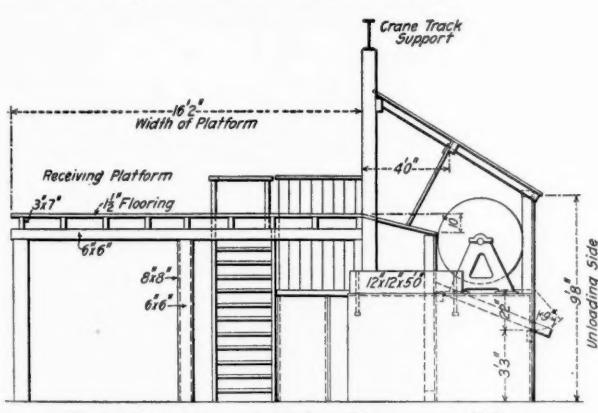
"Upon a careful consideration of all the evidence and the statements and arguments submitted, and in view of all the services rendered by the railways, we are of the opinion that the prices now paid to the railway companies for the transportation of the mails are not excessive, and recommend that no reduction thereof be made at this time."

(See Report 2284, House of Representatives, 56th Congress, 2d Session.)

This Commission also concluded as to the pay for railway postoffice cars:

"Taking in view all these facts as disclosed by the testimony filed herewith, we are of the opinion that the prices paid as compensation for the postal car service are not excessive, and recommend that no reduction be made therein so long as the methods, conditions and requirements of the postal service continue the same as at present."

Since the above recommendations were made, the operating cost on railways, and, consequently, the cost of handling the mail, have been largely increased, as hereafter shown, through



End Elevation of Tube Cleaner Building.

The accompanying drawings will give a general idea of the arrangement of the machines and trestles. The best record is 69 finished flues in 60 minutes, and the average cost for passing a set of flues through this shop from the rattler to the delivering car is from 1 1/4 to 1 1/2 cents per flue.

We are indebted to D. Gallaudet, division master mechanic Baltimore & Ohio, for this description and the illustration. He designed the special machinery and grouped the various operations so as to make it possible for two men to keep the flues moving from the time they roll out of the rattler until at the rate of one a minute, they drop on to the delivery car ready to go back into the boiler.

At the Burnside shops of the Illinois Central the tube

higher prices for both material and labor, so that if the railways were not overpaid ten years ago, the present rates, being lower than those paid at that time, would be too low and should really be increased to give the railways a reasonable return. Far from doing this, legislation enacted in the past few years has had the effect of cutting down the mail pay of the railways, whilst the special requirements as to service and equipment have been made more severe and exacting.

Recent acts of Congress or orders of the Postoffice Department, which have the force of law, that have caused reduction of railway revenues, are the following:

1. Act of Congress of March 2, 1907, reduced pay on all routes moving in excess of 5,000 pounds per day. This reduced the pay for handling mails \$1,740,494.63, or 3½ per cent. of the total earnings. The same act reduced the rental rates for railway postal cars \$935,974.09 per annum, or 16 per cent. The total reduction in pay to the railways under this act was \$2,676,468.72, or 6 per cent. of the total compensation for both classes of service.

2. Act of Congress of June 26 1906, effective July 1, 1906, withdrew from the mails empty mail bags and certain supplies, to be thereafter shipped as freight or express. It may be conservatively estimated that the annual loss in mail revenue to the railways by withdrawing these shipments from the mails is at least \$1,000,000, with practically no reduction in space furnished because of this change.

3. Order of Postmaster-General of June 7, 1907, changing with each mail weighing thereafter the method of computing average weights on which pay is based from that always previously used and theretofore regarded as the proper interpretation of the law. The effect of this on the mail weighings of 1907 and 1908 was to reduce railway mail pay in two sections of the country, \$2,222,108.92, or 9½ per cent., or at the rate of \$4,500,000 per annum for all roads of the country.

4. Orders of Postmaster-General reducing railway postal car pay by allowing "shorter-car" pay on certain lines than heretofore authorized and changing certain full lines to half lines, that is, reducing pay for return movement; thus causing an annual loss to the railways of \$345,287.06. (Second Assistant Postmaster-General's Annual Report 1908, page 13.)

The effects of all of these reductions on the mail revenue of the railways aggregate \$8,500,000 per annum, or 17 per cent. of the total pay received by them in the year ending June 30, 1908, for handling the mail and furnishing railway postal cars.

These reductions were made without justification and for the purpose of reducing railway revenues, and, incidentally, the expenses of the Postoffice Department, at a time when the net earnings of the carriers seemed large to the public mind; although under these favorable conditions the returns to the shareholders approximated but 4 per cent., whilst farmers were receiving 10 per cent., manufacturers 15 per cent. and National banks 18 to 20 per cent.

It is true that there has been a large increase in the gross revenue of the railways in the last ten years, but this has accrued from traffic other than carriage of the mails and has been accompanied by great increase in operating expenses. In fact, were it not for the economies of the carriers, effected by the use of more powerful locomotives and larger freight cars, the increase in operating expenses would, without doubt, have fully neutralized the growth in revenue. In the months preceding the panic of October, 1907, the railways were quite generally showing decreases in net earnings in face of the largest gross earnings in their history. It was costing them much more than a dollar to handle every dollar increase in gross earnings.

Since the hasty enactment of ill-considered legislation reducing mail pay, the revenues of the roads have been seriously affected by a change in business conditions which has reduced traffic without reducing prices of materials and labor. At the

same time, legislation has increased labor costs by reducing hours of service.

In 1898 rates for transporting the mails were too low to cover the cost of service, they are much too low now, and the losses on the mail service as a whole—there are some routes that pay—are borne by freight traffic entirely.

#### RECEIPTS FROM MAIL AND OTHER RAILWAY TRAFFIC.

The latest statistics of operations of all railways of the United States are for the year ending June 30, 1907, issued by the Interstate Commerce Commission, July 9, 1908. From them we compile the following exhibit comparing results of 1907 and 1898—when a Commission of Congress, after complete investigation of the subject, recommended that mail rates be not reduced.

Year ending June 30—	1907.	1898.	Per cent.
Earnings from passengers .....	\$564,606,343	\$266,970,490	Inc., 111
" express .....	57,332,931	25,908,075	" 121
" mails .....	50,378,964	34,608,352	" 46
" freight .....	1,823,651,998	876,727,719	" 108
Operating expenses .....	1,748,515,814	817,973,276	" 114
Passenger train mileage .....	541,439,176*	341,526,769	" 58
Freight train mileage .....	662,106,857*	503,766,258	" 31

\*Including mixed trains.

Earnings per passenger train mile (cents):	1907.	1898.	Per cent.
From passengers .....	105.7	79.4	Inc., 31
" express .....	10.7	7.7	" 38
" mails .....	9.4	10.3	Dec., 10
Total .....	125.8	97.4	Inc., 29
Number of passengers carried per train .....	51	39	Inc., 31
Tons of mail carried per train .....	.86	.80	" 7
Earnings per freight train mile (cents):—			
Earned from freight .....	274.0	173.1	" 58
Tons of freight carried per train .....	357.35	226.45	" 58
Operating expenses per total train mile, cents. 147.0	95.6	" 54	
Net earnings per train mile (cents):—			
Passenger trains .....	21.2*	1.8	
Freight .....	127.0	77.5	" 64
Passenger earnings per pass. mile, cents .....	2.014	1.973	" 2
Mail earnings per mail ton mile, cents .....	10.66	12.57	Dec., 15
Freight earnings per freight ton mile, cents .....	0.759	0.753	Inc., 1

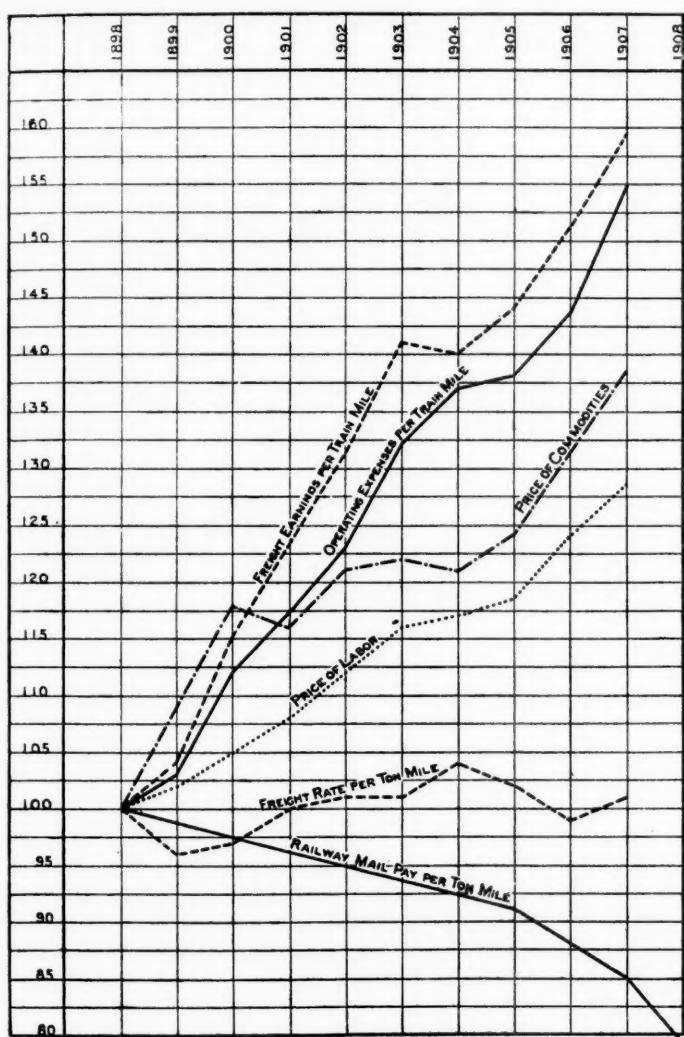
\*Loss.

NOTE.—Bear in mind these figures do not, of course, show effect of cut of \$8,500,000 in mail pay effective July 1, 1907, or losses in net revenue through depression in business conditions commencing in latter part of 1907. As an index of the latter, the *Commercial and Financial Chronicle* of September 5, 1908, showed that 141 roads, aggregating 168,839 miles, or 70 per cent. of all roads in the country, had suffered a loss of \$63,484,902, or 24.97 per cent., in net earnings in the first half of the calendar year 1908, as compared with same period of previous year.

The foregoing statement clearly shows the difference between the revenue obtained from passenger trains as compared with freight trains. The control of the former is largely out of the hands of railway operating officers, as to meet competitive and traffic conditions, heavier and more luxurious passenger cars must constantly be furnished, which, of course, means largely increased expense with very little increase in the paying train load. In fact, as to the mails, notwithstanding an increase in tonnage carried on the average train, the mail earnings per passenger train mile were actually less in 1907 than in 1898, due largely to the automatic reduction of railway mail pay per ton mile. Considering the freight train mile, the composition of which is almost entirely within the control of the railways, which institute methods for reducing cost of transportation, it will be observed that by such methods the railways have been enabled to place 58 per cent. more tonnage in a train, bringing them 58 per cent. more earnings, which can be applied as an offset to the increase of 54 per cent. in the cost of running a train one mile.

This increase in operating expenses per train mile last referred to has been brought about largely because of the increased cost of labor and materials, which, as is well known, has been general throughout the country.

Chart marked "Exhibit A" shows, using year 1898 as unity, or 100, the increase in cost of railway operating expenses per train mile as reported to the Interstate Commerce Commission, the rise in prices of labor and commodities from statistics collected by the United States Department of Labor, Bulletin No. 75 of March, 1908, and No. 77 of July, 1908, the average rate per ton of freight handled one mile as reported by the Interstate Commerce Commission and the average rate of railway mail pay, including pay for postal cars, received by



**Exhibit A: All Railways in U. S. Relative Results from Mail and Freight Traffic, Prices of Labor and Commodities.**

the railways per ton mile, computed from Annual Reports of the Postoffice Department.

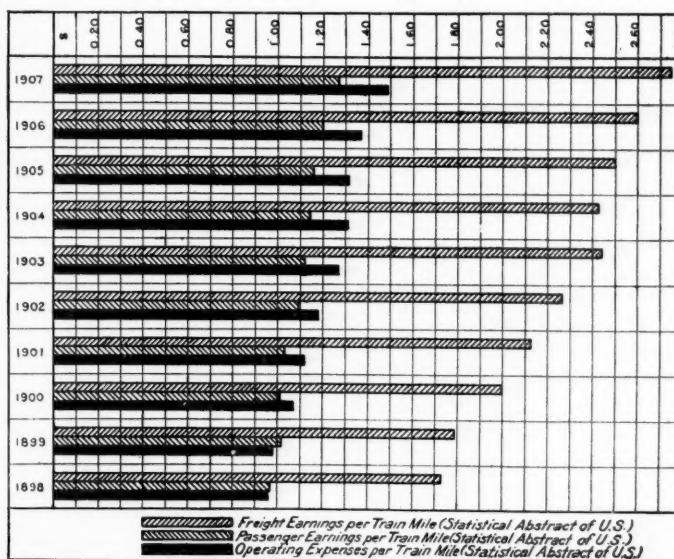
Note the close parallelism of the curves of Earnings, Expenses, Prices of Commodities and Labor. Note that freight rates in 1907 were slightly higher than in 1908, and in the whole period were never more than 4 per cent. below or above 1898, and note particularly that the rate of mail pay reduced automatically 15 per cent.

To further illustrate the difference in compensation to the railways from freight and passenger service, see "Exhibit B" showing for each of the years ending June 30, 1898, to 1907, inclusive, the actual earnings per train mile received from freight and passengers and the actual operating expenses per train mile. This chart shows that whilst in 1898 passenger train earnings were slightly more than the cost of running a train, in 1907 it cost considerably in excess of the earnings received from a passenger train to run it, showing that passenger traffic as a whole, including the mails, does not pay its fair share of operating expenses, regardless of taxes, interest on bonds, or dividends, and this it should do—as pointed out by Judge Cooley, the first Chairman of the Interstate Commerce Commission.

Comparing results of the operations of all railways of the United States for the year ending June 30, 1907, with 1898, when this question was last up, it is shown by reports of the Interstate Commerce Commission that gross revenue from operations, as well as income from investments, increased \$1,380,000,000. This is a very large sum, but let us see what becomes of it. Increased wages paid to employees consumed \$577,000,000, or 42 per cent., purchase of material included in

operating expenses, \$354,000,000, or 26 per cent. of the increased income, and these material purchases represented largely labor involved in their production. Increases in betterments and miscellaneous deductions consumed \$77,000,000, or 6 per cent. of the increased income. Larger payments for interest on funded debt and current liabilities consumed \$96,000,000, or 7 per cent., and larger taxes 2.5 per cent., leaving \$240,000,000, or 16.5 per cent. of the increased income for the owners of the properties, the stockholders. In 1898 dividends were less than 2 per cent. of the capital stock, and in 1907, even with the large increase noted, they were only 4 per cent. Contrast this with the manufacturers' returns of 15 per cent., the farmers' of 10 per cent., and the National banks' of 18 to 20 per cent. on their capitalization. \* \* \*

Reduction in railway mail pay was not justified in 1898; it was far less justified in 1907. On the contrary, there has been a large fall in mail pay per ton mile, and conditions under which mails are transported are becoming more and more onerous. The cost of building a railway postoffice car to the present plans and specifications of the Postoffice Department is at least 50 per cent. more than it was in 1898, although pay received for handling these cars that weigh from 25 to 30 per cent. more than formerly has been arbitrarily cut over 16 per cent. by the Act of Congress of 1907, and has since been further cut through readjustment of routes. For the year ending June 30 1908, the railways received gross \$48,155,379, including railway postoffice pay, for carrying 80 per cent. greater tonnage of mails than in 1898, a sum \$12,747,629 less than it would have been but for the reduction of rate from 12.59 cents in 1898 to 9.94 cents in 1908. In face of this, as we have shown, arbitrary cuts of \$8,500,000 more have been



**Exhibit B: All Railways in U. S. Earnings and Expenses per Train Mile.**

made, a grand total of over \$21,000,000 less paid now than ten years ago.

This increase\* in weight of a postal car might not be thought

\*About 18 months ago, the conclusion was reached that heavier and stronger cars were demanded by changed conditions resulting in heavier trains, greater speed and increased frequency and consequent risk of accident to clerks and mail in collisions and wrecks. After careful investigation and expert testimony, the specifications were revised so that full 60-ft. cars would weigh about 100,000 lbs. instead of 80,000 lbs., and be greatly strengthened by the free use of steel plates and oak timbers. To meet the views of car builders, east and west, two plans and specifications, slightly differing, were adopted as standard, and railways were given the option of conforming to one or the other. The best known anti-telescoping features were adopted in both plans, producing in the judgment of responsible car builders, a car of exceptional resisting and carrying power. When new lines of cars are authorized by the Department, or new cars are ordered to take the place of old cars in service, companies operating the routes are furnished copies of these specifications and the superintendent of division is instructed to see that cars are built in conformity therewith. Inspections are made while the car is in the shop, and when it is completed a full report is made and forwarded to the Department. A decision is then reached as to whether the car is satisfactory and can be accepted.—(Annual Report Postmaster-General for 1905.)

of much moment, but it means to the railways the movement of 1,000,000 additional gross ton miles per car per year, costing them \$10,000 per annum in operating expenses, whilst, as shown, they receive 16 per cent. less railway postoffice pay now than formerly.

United States Postal Laws and Regulations, Section 1164, provide that the average weight of the mails used in fixing rates shall be established by the actual weighing of the mails for a period of not less than thirty days and "not less frequently than once in every four years." The construction placed upon this by the Department has been the one which reduced to the minimum the pay which the railways receive for services rendered. If mail traffic were stationary, weighing every four years would not matter much, but the increase of mail matter throughout the United States has been very great, and, because of the policy of the Department to weigh the mails not more frequently than every four years, heavy losses have resulted through the railways having to haul tonnage for three successive years following each weighing for which they receive no pay.

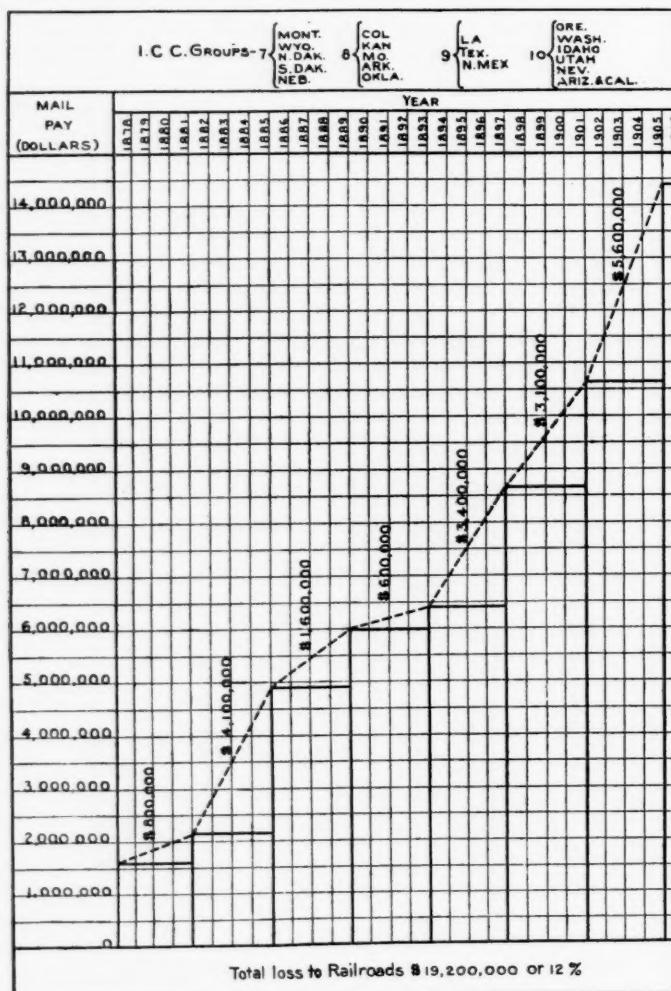


Exhibit E; Loss in Revenue by Weighing Mail Quadrennially Instead of Annually.

"Exhibit E" shows, for roads in Interstate Commerce Groups 7, 8, 9 and 10, by heavy lines the mail pay actually received as determined by the quadrennial weighings, and by dotted lines the natural increase in railway mail pay the roads should have received if the mails were weighed annually. Opposite each triangle is placed the amount of money loss to the railways through the existing policy, this loss aggregating in the periods given for roads in Groups 7, 8, 9 and 10, \$19,200,000, or 12 per cent. of the aggregate railway mail pay. In other words, this loss is equivalent to a reduction in the rate received per ton mile in these groups of states of 12 per cent.

The loss to roads in the western part of the United States is most striking, due as it is to the rapid growth of that section. The same reduction, though to a slightly less degree, obtains in other parts of the United States.

#### COMPARATIVE DECLINE ON MAIL, PASSENGER AND FREIGHT RATES.

"Exhibit G" shows that during the past ten years, from 1897 to 1907, when railway operating costs have been increasing, mail rates have been automatically reduced 16 per cent., with an increase of only 44 per cent. in density of traffic. During the same time, the freight ratio fell only 5 per cent. with an increase of 103 per cent. in density of freight traffic. And, remember, that increase in freight traffic density means opportunity to lessen cost of transporting through larger car and train loads, whilst increase in mail traffic density affords no such opportunity, as under Postoffice Department regulations, which govern with the force of law, considerations of convenience are paramount and no measures of economy are permitted.

When the mail in a car reaches the low maximum of about two and three-quarter tons, greater density means additional cars, and, therefore, added operating cost about in proportion to traffic carried. The same is to a lesser extent true with handling passengers, but Chart "G" shows that passenger rates have been held up quite uniformly whilst density has increased 84 per cent., or nearly double that of the mails.

The actual reduction in rates per traffic unit during the past ten years has been as follows, authorities being Statisti-

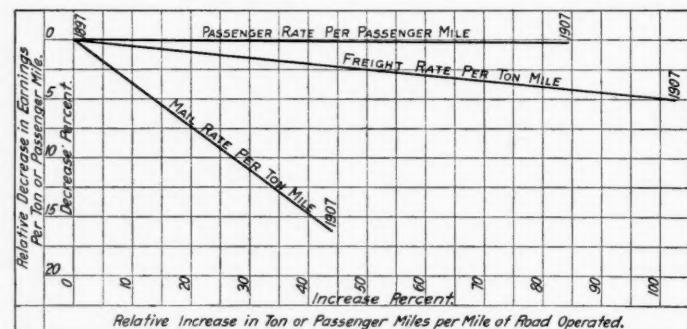


Exhibit G; Changes in Rates per Mile.  
Showing for all railways in U. S. that automatic reduction in mail rates with increases in weight has caused a greater fall in actual railway mail pay than in passenger or freight traffic.

tical Reports of the Interstate Commerce Commission and computations based on annual reports of the Postoffice Department:

	1908.	1907.	1898.	1897.
Mail rate per ton-mile, cents.....	9.94	10.66	12.57	12.67
Freight rate per ton-mile, cents.....	No data.	.759	.753	.798
Passenger rate per pass'gr mile, cents...	No data.	2.014	1.973	2.022

\*Including R. P. O. car pay.

The above is an answer to the argument frequently made that railway mail pay was not changed until the reductions made in 1907. The sliding scale fixing lower mail rates with increasing density is the factor that controls the actual lowering of rates, with the important difference that railways are forbidden to bring about economies in operating cost with mails that they can when freight density increases, and the further important difference that mail rates continue to fall automatically despite changes in industrial conditions which make it much more expensive for the railways to perform the service.

(To be continued.)

We noted at the time (long ago) the robbery of an express train going from Toulouse to Paris, in which trainmen were severely wounded. The robbers were caught and were recently tried. The leader was condemned to death; one of his comrades to imprisonment for life; another to five years and another to two years in prison. The trainmen shot had recovered.

## A UTOPIAN RAILWAY PROJECT.

BY ROBERT W. WILSON.

Each of the six states of the Australian commonwealth owns and operates its own system of railways. These railways have been built entirely with money borrowed in the United Kingdom on the good faith and credit of each individual state for its own separate uses. No bond, or other security, specially ear-marking its railways or, in fact, any of its other assets has ever been given by any Australian state in the issuance of any loan. More than four-fifths of the whole public indebtedness of Australia has been incurred for the construction of railways, and none of the six states has ever had much difficulty in floating loans for these or other public works.

Each state also owns the lands within its confines, save such areas as have passed into private ownership. The land grant system of railway construction has not found favor in Australia, although nearly a generation ago a very bitter political fight was fought on the question. At that time Sir Thomas McIlwraith was Premier of Queensland and put forward a project of constructing a trans-continental railway, which was to be built by an English syndicate in return for large land grants in Western Queensland. The sheep and cattle owners were bitterly opposed to the project and organized to secure its rejection. In this they were successful and the McIlwraith government was turned out of office. Out of the turmoil at that time and the discussion which it created was evolved a proposal so daring in its conception and so brilliant in its possibilities that it holds for many thoughtful Australians possibilities of resurrection at some future day.

Briefly stated, the proposal was to introduce on the Queensland government railways uniform rates, both for passengers and freight, irrespective of the distance for which the traffic should be carried. The postoffice and telegraph services were instanced as analogous cases, in both of which a low uniform rate covered the price of the service, irrespective of distance. Naturally, to work the Queensland railways under such conditions would involve a heavy loss not only on "fixed charges" as represented by the interest on the money spent on their construction, but also on operating expenses. To meet this it was proposed to increase the rentals of all the pastoral lessees in the interior to an amount that in the aggregate would pay the interest on the whole public debt of Queensland and cover any deficit on the operating account of the railways as well. Wool-growing was then the most profitable use to which land could be turned, and it was freely conceded that the lands of the interior were better suited and more valuable for this purpose than the lands nearer the east coast, but without cheap carriage to port they were unavailable for this purpose.

It may be imagined that such a project would be hailed with derision, but it was not so. Some of the leading pastoralists who would be principally affected by the increased rentals took up the proposal seriously and maintained that a good case had been shown for further inquiry. Among them was the late James Tyson, the richest man that Australia has, as yet, produced. Tyson made his home in Queensland, at Felton station, on the Darling Downs, and had property and business interests in all the other Australian colonies. He had a more comprehensive knowledge of the interior of Australia and its capabilities, and especially of Queensland, than any man of his day. Tyson was no visionary, but a hard, conservative man of business. Many people called him a miser, but that was untrue. As a native-born patriotic Australian, Tyson saw the tremendous possibilities inherent in a uniform rate on the state-owned Queensland railways, and his practical experience enabled him to say that sufficient rental could be obtained from the government-owned lands of the interior to leave an ample margin of profit to the lessees, provided they had the cheap transportation proposed. Sir Thomas McIlwraith was a railway engineer by profession and

ridiculed the proposal, which he refused even to discuss seriously. No attempt was made then or since to bring the matter before the Queensland Legislature.

Still the idea will not down, and during the generation that has passed since it was first mooted it has cropped up from time to time as a subject of academic discussion. It is said that the Hon. Alfred Deakin, Prime Minister of the Commonwealth, is inclined to believe in the idea theoretically, for the whole of Australia, but the difficulties of carrying it into effect for the whole island continent would be enormously greater than were to be faced in Queensland alone thirty years ago. Under the Australian commonwealth constitution, which came into force on the first day of the present century, the federal government "may" take over the railways of the six separate states. Further, the commonwealth "may" assume the outstanding indebtedness of the six states, and negotiations attended with great difficulty have been in progress with this object, both in London and Australia for several years past. The two propositions are inseparable. If the federal government assumes the state debts, then the state railways, for the construction of which the debts were incurred, must pass to the commonwealth. At the same time the state will continue to own, each within its own boundaries, the unalienated lands of the interior.

The situation is one of great difficulty, which is not lessened by state jealousy of the federal power and considerable inter-state friction between state politicians outside the federal arena. Still, Australia has given many notable instances of the lengths she is prepared to go in the way of "advanced" legislation, and a time will probably come when the people, getting tired of the squabbles of politicians, will insist on the federal government going right ahead on the lines originally laid down by "the fathers of the constitution." In that case the commonwealth will assume the state debts, and it will at the same time take over the railways of the six separate states and amalgamate them in one federal system. This would necessarily be a work of time and difficulty, as in "the old cut-throat days" of warring tariffs between the Australian colonies, prior to federation, the different colonies adopted different gages for their railways as an additional artificial means of restricting intercolonial traffic. Still the genius of young Australia will no doubt be quite equal to overcoming all obstacles in due course, and when the commonwealth has its railways federated under one central control, it is fairly certain that the proposal for a uniform rate, both for passengers and freight, will again crop up.

For Australia, were it practicable, the project has many attractions to commend it. One of the misfortunes of the island continent is that the larger cities contain populations enormously in excess of the populations in the back country from which they draw their subsistence. Melbourne and Sydney have enormous populations, utterly out of proportion to the distribution of the people throughout the territories of which they are the seaports, and in a lesser degree this is also true of Brisbane, Adelaide and Perth. People in the large Australian coast cities show little inclination to go inland and settle on the soil. It is not that the soil is unproductive, the occupation unprofitable or the life unpleasant, but that distances are long and the cost of railway transportation heavy. Besides which a man or woman having had some little taste of city life does not care to relinquish it entirely, or get back to it only at the cost of "a king's ransom" in the way of a railway fare. With a cheap uniform rate on the railways through the interior there would be farms, orchards, vineyards and other small holdings at frequent intervals all through long stretches of country now wholly given over to cattle and sheep. The congestion of the cities would be relieved and the natural growth of Australia would be wonderfully promoted by what it at present most needs—a contented class of small settlers on the soil.

Old maps of Australia show its central portion as "the

great stony desert." This is a very mistaken description of what will some day possibly be the most valuable part of the commonwealth. There are areas there of enormous extent, carrying large herds of cattle, that have soil equal to anything that is to be found on the prairies in Western Canada, and the natural grasses and herbage are ideal for the pasturage of stock. With cheap carriage at a uniform rate, wool production would be profitable over a large extent of this part of Central Australia, and away west of it into the northern territory of South Australia for several hundred miles. The wool production of Australia would be trebled with cheaper inland railway freight charges; while agriculture, in all its branches, would blossom out in all directions, with cheaper transportation charges for both the producer and his product. That, at any rate, is what many thoughtful and patriotic Australians think, and when the time is ripe for it they will not shrink from the consideration of a proposal to operate the national railways at a loss, provided the loss can be made up otherwise, and that there is sufficient compensating gain to the commonwealth for the innovation.

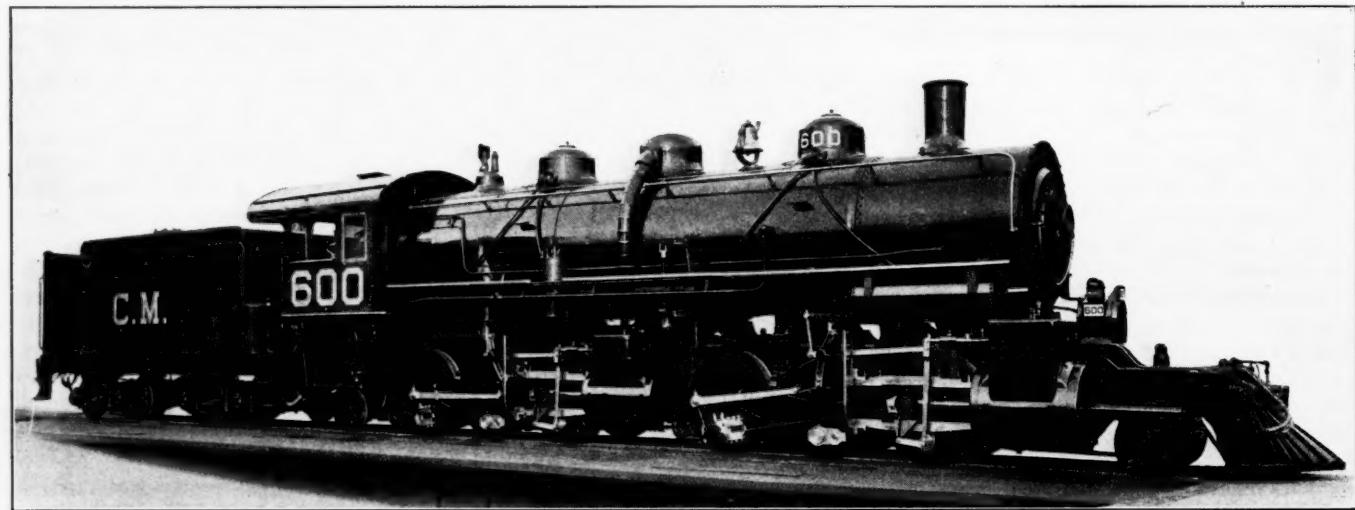
**MALLET COMPOUND LOCOMOTIVE FOR THE MEXICAN CENTRAL.**

The Baldwin Locomotive Works built, for the Mexican Central, the Mallet locomotive shown herewith. It is intended for freight service on the Tamasopo division where there are frequent curves of from 15 to 22 deg. and maximum

pressure steam pipes. The circumferential seam in front of the dome is triple riveted.

The boiler shell is supported above the high pressure cylinders by a cast steel saddle, which is independent of the cylinders and is made in two pieces placed one above the other. The high pressure cylinders are separate, while the low pressure cylinder castings are bolted together, back to back, on the center line of the engine. The valve gears are equipped with cast steel links, and the link bearings for both the high and low pressure gears are bolted to the guide yokes. Reversing is effected by the McCarroll power-reversing mechanism. The exhaust steam pipe from the low pressure cylinders to the smoke box has been improved by providing greater flexibility. The pipe is fitted with a ball and socket joint at each end, the joint being kept tight by a coiled spring, which holds the pipe firmly against its seat. The slip joint in the middle is made tight by snap rings and leakage grooves. Oil holes are provided for lubricating this joint.

The centering device is placed under the smoke box and is furnished with a double helical spring, which is thrown into compression when the leading group of wheels is displaced toward either side. The spring is placed between stops, which are mounted on a suitable guide rod and which may be forced toward the center line of the engine by brackets bolted to the frame cross-tie. The stops are held between the end walls of a steel casting which is rigid with the boiler. The frames are of cast steel  $4\frac{1}{2}$  in. wide and placed 43 in. between centers. The front and back engine trucks are equalized with the cor-



Mallet Compound for the Mexican Central.

grades of 3 per cent., compensated, and the track is laid with 85-lb. rails. The weight of this engine is distributed over a wheel base of 44 ft. 2 in., while the rigid wheel base is but 9 ft. 10 in. The 2-6-6-2 wheel arrangement is employed and the locomotive is designated as class H, according to the railway company's classification.

In its general features, this locomotive resembles the standard gage Mallet engines heretofore built by the Baltimore Locomotive Works, although improvements, based on previous experience, have been made in some of the details and various changes introduced to suit the practice of the Mexican Central.

The boiler is of straight-top type with a radical stayed fire box and is equipped for burning oil. The shell is 78 in. in diameter in front and is built with three rings. The first and third rings are sextuple riveted with butt seams on the top center line. On the second ring, which carries the dome, the seam is also placed on top, but is welded throughout its length with a heavy liner inside. Liners are also placed inside the shell over the high pressure cylinder saddle and waist supports. The dome is of steel, cast in one piece, with short connecting pipes through which steam is delivered to the high

responding groups of driving wheels, the front truck being center-bearing, while the rear truck is side bearing. The trucks and wheels are steel-tired, with cast iron centers, and these, with the tender wheels, were made by the Standard Steel Works Co., Philadelphia, Pa. Among the larger cast steel details used on this locomotive may be mentioned the driving wheel centers, driving boxes, cylinder heads, steam chests and steam chest caps.

The tender has a water capacity of 8,000 gals. and an oil capacity of 3,500 gals. The tanks are wedge-shaped and placed one above the other. The frame is built of 12-in. channels, and the trucks are of the arch-barred type with cast steel bolsters and rolled steel wheels.

This locomotive was designed in the light of nearly two years' experience with similar engines in heavy service on mountain roads and satisfactory results may therefore be anticipated. The leading dimensions and ratios are as follows:

Cylinders .....	$21\frac{1}{2}$ in. and 33 in. x 32 in.
Boiler, diameter .....	78 in.
Boiler, thickness of sheets.....	$\frac{3}{4}$ -in. and $\frac{7}{16}$ -in.
Steam pressure .....	200 lbs.

Firebox, length	123 $\frac{1}{16}$ in.
" width	71 "
" depth, front	73 "
" depth, back	70 "
" thickness, sides, back and crown	3 $\frac{3}{8}$ "
" thickness, tube	3 $\frac{1}{16}$ "
" water space, front, sides and back	5 "
Tubes, material	Steel
" number	350
" diameter	2 $\frac{1}{4}$ in.
" length	.21 ft.
" gage	No. 12
Heating surface, firebox	201 sq. ft.
" " tubes	4,311
" " total	4,512 "
Grate area	61 "
Wheels, diameter, driving	.55 in.
" " truck, front	20 $\frac{1}{2}$ "
" " truck, back	28 $\frac{1}{2}$ "
" " tender	33 "
Journals, driving, main	10 $\frac{1}{2}$ in. x 12 in.
" driving, others	10 " x 12 "
" truck	6 " x 12 "
" tender	5 $\frac{1}{2}$ " x 10 "
Wheel base, driving	.28 ft. 2 in.
" rigid	9 " 10 "
" total engine	.44 " 2 "
" engine and tender	.70 " 11 "
Weight on drivers	300,000 lbs.
" truck, front	19,000 "
" truck, back	19,000 "
" total	338,000 "
" engine and tender, about	495,000 "
Water capacity	8,000 gals.
Oil capacity	35,000 "
Tractive effort	67,500 lbs.
Weight on drivers	= 4.44
Tractive effort	
Total weight	= 5.00
Tractive effort	
Weight on drivers	= 88.75*
Total weight	
Tractive effort x diameter drivers	= 822.80
Heating surface	
Heating surface	= 73.96
Grate area	
Firebox heating surface	= 44.54*
Total heating surface	
Weight on drivers	= 66.48
Heating surface	
Total weight	= 74.91
Heating surface	
Displacement 2 h. p. cylinders, cu. ft.	= 13.4
Heating surface	
Displacement 2 h.p. cylinders	= 336.71
Grate area	
Displacement 2 h.p. cylinders	= 4.55

\*Per cent.

## FOREIGN RAILWAY NOTES.

It is reported that in the course of the excavations for the Amoor Railway rich deposits of gold have been found, so that many workmen have deserted the railway service to dig gold, and the government has ordered soldiers to guard the mines and keep unauthorized persons out of them. Gold has been mined along the Amoor for a very long time, almost exclusively by Chinese, others not finding the results satisfactory.

The regulations for the physical examination of men who desire to enter the Prussian railway service require that they have normal vision and capacity for distinguishing colors, good hearing, be free from bodily infirmities which may restrict their ability to do service, and from any latent disposition to infirmity which would disable them. Especial attention must be paid to ascertaining that they have a sound nervous system.

## ELECTRIC TRACTION BY SIMPLE ALTERNATING CURRENT ON EUROPEAN RAILWAYS.\*

BY H. MARCHAND-THIRIAR.  
Electrical Engineer, Brussels.

The electrification of railways is indisputably making progress on the Continent, and three countries at least are at the present time actively engaged in the installation of electric traction on their railways: these countries are Sweden, Switzerland and Italy.

The change of method of traction promises great advantages in these countries owing to the abundance of water power, and the consequent possibility of obtaining electrical energy at a low cost. By the abolition of the expenditure on coal, an enormous saving in the working expenses can doubtless be realized.

In Switzerland, some very important schemes have been prepared lately for the Vorarlberg railway, the line from Innsbruck to Zurich and also the St. Gotthard-Milan Railway. Hence it may be anticipated that other transformations will be made, in addition to those already effected in this most favorably situated country.

In Italy, large sums of money have been set aside for the electrification of a dozen lines having a total length of 193 miles, exclusive of the line connecting Milan and Genoa, which is also under consideration.

In Sweden, after exhaustive preliminary investigations, the work of electrification seems likely to enter a period of active development.

Many waterfalls have been taken over by the Government which to-day owns those of Karse, Trolhätta, Motala, Hammarby and Elfkarleby; it is proposed to equip the whole of the railroad system in the south of the country which comprises some 1,243 miles of line.

The method adopted generally in Sweden is that of simple alternating current; this method has also been selected for two of the proposed Italian lines.

The single-phase method, which had only formed the subject of very limited trials in Belgium up to 1904 (when the papers by Messrs. Ernest Gerard, Paul-Dubois, Tremontani and Young were read at the Washington session of the Congress) has proved its practicability and appears likely to be the method of the future.

In a report which he recently made to the Belgian Light Railways Association, Mr. Eric Gérard wrote: "If one may be permitted to draw attention to the tendency which is now apparent, it is noteworthy that the opinion is held by many electrical engineers that the simple alternating current will play the most important part, since it appears to meet the traffic conditions of the majority of light railways successfully. The question is of peculiar interest for small densely populated countries like Belgium, in which the adoption of a service of light and frequent trains, must gradually come into force over almost all the railways."

Quite independently Mr. Wittfeld, electrical engineer, consulting engineer and expert of the Prussian State Railways, on returning from a visit to the United States, confirms the increasing application of the simple alternating current in America. Since the object of Mr. Wittfeld's visit was to study the American methods of electric traction, with a view to the adoption of electric traction on the German railways, it is possible that the simple alternating current may be employed in several cases on the Prussian lines.

For the above reasons, it may be opportune to examine the traction systems which employ the simple alternating current; these systems, moreover, represent the latest practice in electric traction. As shown at the Washington meeting of the Congress, there are several different systems, similar in fundamental principle, which have been developed by and are

\*Abstract of an exhaustive article in the Bulletin of the International Railway Congress, September, 1908.

known after Ward-Léonard, Lamme Finzy, Winter and Eichberg, and Latour respectively. Some of these make use of a compensated induction motor; such are Thomson-Houston and the Allgemeine Elektricitäts-Gesellschaft; others use series-wound motors; such are those of the Oerlikon Works, of the Westinghouse Company, of Siemens-Schuckert and of the Gadda Company.

The Electric Construction Works of Charleroi, the International Electric Company of Liège, the Felten und Guilleaume Lahmeyer Werke, the Brown-Boveri Company are also working on the subject of electric traction by simple alternating current and are making exhaustive experiments; the Felten und Guilleaume Lahmeyer Werke in particular have designed and tested a motor, operated by simple alternating current, which shows very great promise.

The preference shown for the simple alternating current is justified by the fact that this method combines the advantages of both the continuous current method and the three-phase method; it shows perfect suitability for urban light railways, for light railways proper and for main railway lines on which heavy trains require to be hauled over long distances; the simple alternating current affords a means by which the high-tension current (which alone can be employed for transmission of energy to a great distance) can be led direct to the vehicles and the transformer, which is carried on the vehicle and reduces the high voltage of the supply to a voltage suitable for the motors, and serves the double duty of regulating the tractive force and the speed.

Apart from the above, and contrary to what is the case where three-phase current is employed, a single conductor alone is necessary for the supply of current to the vehicles, so that the conductors are just as simple in the case of the continuous current. It is worth while recalling the fact that the firm of Ganz & Co. in their trials of the Valtellina, (although this scheme had been most carefully worked out) were unable to overcome all the difficulties due to the closeness of two conductors carrying 3,000 volts (the two conductors carried two of the phases, the third being carried by the rails). The firm of Siemens & Halske and the Allgemeine Elektricitäts-Gesellschaft have, it is true, worked at 12,000 volts on their Berlin-Zossen line with three-phase current, but their experimental line was devoid of either points or crossings. Notwithstanding the increased weight of the vehicles, a better result is obtained from the simple alternating current than from either of the other methods, owing to the elimination or the reduction of the losses in transformation and transmission. And moreover, if certain expenses are greater in the case of the simple alternating current, the conductors are, on the other hand, much less costly and the total efficiency is higher.

Thus on the Murnau-Oberammergau railway, the total efficiency measured between the generating station bus-bars and the tires of the wheels amounted to 62 per cent. with continuous current, 66 per cent. with three-phase current and 71 per cent. with simple alternating current (not converted).

For the same line, the cost of installation, conductors and rolling stock would have been considerably heavier with the three-phase current of the continuous current than with the simple alternating current, the extra costs being 16 per cent. and 25 per cent. respectively.

A great advantage of the simple alternating current is that it permits the use of the overhead conductors, which it had been found necessary to abandon in the case of heavy traction by means of the continuous current. The Americans who have had great experience in the use of the third rail have made use of voltages of 800 and 1,000 volts and it appears probable that even these figures will soon be exceeded; but the third rail is expensive, it adds greatly to the cost of inspection and maintenance of the permanent way; moreover, even were it possible to work up to 2,000 and 3,000 volts with the continuous current, this would only admit of operating comparatively short distances; and again, it is only by reducing the

margin of safety in working, that the voltage on the line can be increased; thanks to the adoption of the communicating pole, the running of the motors has been so improved that there is no risk of sparking at the brushes; but the motors have, at the same time, become more delicate and heavier; the necessity for better insulation of the windings has involved an increase of about 20 per cent. in the weight of these, which has considerably reduced the advantage which was possessed, in respect to weight, by the continuous-current motor over the alternating-current motor using brushes.

Apart from the above, the magnitude of the installations using simple alternating current which are proposed is sufficient, in my opinion, to justify a comparative description of the different systems in use up to the present time, more particularly as these have as yet only formed the subject of isolated and generally incomplete papers.

#### MOTORS.

The systems of traction by simple alternating current can be divided into two classes, according to the type of alternating-current motor employed; the one class, as already mentioned, using the series motor, and the other the repulsion motor.

In general, an ordinary series-wound, continuous-current motor, that is to say, a motor supplied through brushes, will run if supplied with alternating current; actually since the current is reversed simultaneously in the field magnets and in the armature, the field changes its direction simultaneously with the change of direction of the current on which it acts, and therefore the turning effort acts in the same direction; the only difference is that instead of a uniform turning effort, the torque will pulsate.

However, if the motor were so operated, serious difficulties would result; the losses due to hysteresis and Foucault currents would be enormous; the self-induction would be excessive, the efficiency would be very low; moreover, sparking of a very serious nature would occur at the brushes.

In the first place, no one would dream of building such a motor without laminating the pole-pieces in a similar manner to that in which the armature has been made for a long time past; this is necessary to keep down the self-induction.

To reduce the latter to a still lower extent, and at the same time to reduce the loss by hysteresis and Foucault currents, the frequency of the alternation the current used has been reduced, and its further reduction is under consideration.

Although the reduction in frequency diminishes the production of sparks at the brushes, the remedies mentioned above do not entirely protect this delicate and costly detail; much more is required. Sparking is caused by the short-circuiting of the armature coils by the brushes while subject to electro-motive forces due to: (1) The flux in the windings surrounding the field magnets which varies and changes its duration with great rapidity, and (2) The fact that these windings also cut at great speed the reaction flux of the armature.

The effect of the electro-motive force resulting from the variations in the magnetic flux, or the static electro-motive forces, can be diminished by inserting resistances in the connections between sections of the rotor with commutator, as is done in the Westinghouse motor for example.

The dynamic electro-motive forces caused by the reaction flux can be neutralized by arranging a coil on the stator of the motor which is short-circuited with or put in series with the rotor and has for object to afford at any instant a number of ampere-turns equal and opposite to those of the rotor. The reaction flux of the armature is thus counteracted. This device is employed in the various motors in use in single-phase traction. When applied to the series motor, in particular, it not only improves the commutation, but also the efficiency, and the latter is its principal object; by means of this device, the only flow in the motors is the flow proper of

the field magnets; the self-induction of the stator above remains and the power factor is increased.

The repulsion motor differs in the first place from the series motor in that its armature is not connected in the outer circuit to the supply circuit; it is instead short-circuited on itself.

The mutual induction between the stator and the rotor generates a current in the rotor; it is easily recognized that this current is approximately in phase with the flux and that a couple is produced thereby.

The repulsion motor, like the series motor, should have the whole of its magnets laminated; its main features should be identical with the latter; it should give a large starting torque and automatic regulation of the energy absorbed. The commutation is excellent at about the speed of synchronisation; there is then no variation in the flux among the sections, the flux being equal and rotating in the motor at the same speed as its windings. The starting torque is a little less than that of a compensated series wound motor, and the apparent absorption of energy is proportionately greater than that of a motor of the latter type; owing to magnetic losses, the mutual induction between the stator and the rotor is unavoidably imperfect.

The compensated repulsion motor is, in a way, derived from the combination of the series motor and the repulsion motor; it comprises the advantages of both types: perfect commutation at normal speed, as in the simple repulsion motor, together with large starting torque, as in the series motor; it requires however, a supplementary set of brushes.

It is actually a series motor, the armature of which is short-circuited by means of two brushes placed so as to form a cross with the main brushes; if these brushes were removed, the motor would be of the ordinary series-wound type; but the auxiliary brushes in question play an important part; the reversal of the flux in the windings which these brushes short-circuit induces a current which tends to neutralize the field which produces it; or in other words: the winding in question acts as the secondary winding of a short-circuited transformer; the result is a great reduction in the self-induction.

This type of motor is that of Mr. Latour, and has been adopted by the Thomson-Houston Company. Since the field windings are in series with the armature, it follows that this type of motor cannot be wound suitably for a high-tension current and that it is necessary to transform down.

As a general rule, the voltage in the armature of alternating current traction motors does not exceed 250 volts for 100 horse-power motors and 150 volts for 40 horse-power motors; the amperage is, it is true, very large, but the reduction in voltage gives much greater safety in working, if possible, than that to be obtained with the best continuous current motors.

The paper then describes at length the various methods of arranging the overhead conductors.

The Oerlikon Works have adopted and are continuing to develop two methods of traction by simple alternating current; the first of these, the Ward-Léonard system, requires the conversion of the alternating current on the locomotive itself into continuous current: the second and more important method is based on the direct utilization of the alternating current to supply the motors. According to the Oerlikon Works, the Ward-Léonard method may show great advantage, in spite of the extra transformation of current, in cases where starting and stopping are of frequent occurrence, and where the track has many changes of gradient. Under these circumstances, it is necessary to avoid excessive demands on the central station while running with a minimum number of large units.

It also enables the energy of braking to be returned, and whereas in the case of the simple alternating system, used in motors with brushes, it is found necessary to reduce the frequency, the Ward-Léonard system is equally applicable to any frequency.

Moreover the line can be worked with a voltage as high as that possible with the simple alternating current; up to 6,000

volts, the current from the conductor wire can be supplied direct to the motors of the converted set; above 6,000 volts a static step-down transformer is used to reduce the voltage to that which the motor can be worked with.

The above mentioned principles have been applied in practice on the Oerlikon locomotive No. 1 which is at present running on the Seebach-Wettingen section of the Swiss federated railroads, constructed for 15,000 volts.

The only respect in which this locomotive differs from the usual arrangement described, is that it is fitted with only two motors, each of which is of 197 horse-power and drives the two axles of a bogie by means of gearing and coupling rods fitted with horn-plates for the driving crank pin brasses; the gear ratio is 1: 3.08; the total weight is 45.27 English tons; the total weight of the electrical gear is 23.82 English tons, the two driving motors by themselves weigh 5.51 English tons; the transformer and converter set weigh 14.37 English tons; the brakes, gearing, etc., 3.94 English tons.

The length of the Seebach-Wettingen line is 12 miles.

Locomotive No. 2 is at the present time at work with locomotive No. 1 on the Seebach-Wettingen line, represents the complete realization of the second method of single-phase traction worked out by the Oerlikon works. Hence the best means for investigating the method will be afforded by a description of the locomotive in question.

Locomotive No. 2 is arranged for the direct supply of current to the simple alternating-current motors; it is fitted with two alternating motors with brushes, each 197 horse-power, and with two transformers each of 200 kilowatts.

The collectors are two in number and of the curved arm type; the current passes from them, after passing through the safety apparatus through the high-tension switch, to the two transformers and thence to the rails.

The secondary windings of the transformers are divided into twenty sections; the terminals of these are connected to a Meyer voltage regulator, by means of which current can be supplied to the motors at any desired voltage, and hence these can be run at any required speed.

The total weight of this locomotive is 40 tons, the electrical portion and brakes weighing 16½ tons.

*The Siemens-Schuckert System.*—In this system the high-tension current is taken from the distributing line by means of a bow collector; it passes through a high-tension cut-out and a fuse, and thence is led to the primary of an oil immersion transformer. The alternate-current motors are coupled to the secondary through a controller which performs both speed regulation and direction control, and may be operated either directly or indirectly. Direct operating is only used under exceptional circumstances in the case of vehicles running on a line where it is thought improbable that trains will be run, which comprise several automotor vehicles. Indirect operating is always used where there are several motor vehicles made up in one train, the electric equipment being then the same for all the vehicles.

The alternating-current motors made by the firm of Siemens-Schuckert are series motors working at a medium voltage (200 to 450 volts), fitted with auxiliary compensating windings on the stator to prevent sparking at the brushes. The motors are ironclad and, when of high power, are artificially air cooled. The armature is fitted with a winding which is formed wound and fitted in open channels, so as to render renewal easy. The stator is fitted with equally spaced teeth and has only two windings; the exciting winding and the compensating winding. The latter is used in part to produce the auxiliary field for improving the commutation. It appears that this is effected perfectly. There is no sparking either at any load or on starting. Moreover, the apparatus is not affected by the drop of voltage which inevitably occurs occasionally in traction work. The torque is large and the speed varies automatically according to the changes in the load. The general arrangement is simple; access to the brushes is

easy; there are no auxiliary brushes, and finally, the motor can be used without any modification on continuous current.

Generally the efficiency is high and the power factor is from 0.9 to 0.95, according to the size of the motor. One of the first and not the least important installation made by the Siemens-Schuckert firm was that of the Muenau-Oberammergau line, 14.6 miles long. This line has been worked since 1905.

#### LOCOMOTIVES SUPPLIED TO THE SWEDISH STATE.

Trials of great importance, since they form the preparatory experiments made with a view to carrying out the scheme which has been worked out for the electrification of the whole system, were commenced by the Swedish State in July, 1905, on the Tomteboda-Värtan section near Stockholm. Single-phase current with series-wound commutated motors was adopted, a frequency of 25 periods per second having been settled on in the first instance. Two locomotives and two vehicles supplied by the Allgemeine Elektricitäts-Gesellschaft and Siemens-Schuckert and by the British Westinghouse Company respectively were tested. One of the special objects of the trials was to determine the limit of voltage which could be used without danger, both in the case of the distributing line and that of the electric installation.

In order to effect this, the generating station supplying the trial section is fitted with arrangements which enable the voltage of the current supplied to the trolley wire to be varied from 5,000 up to 20,000 volts. The Siemens-Schuckert locomotive which was tested, weighed 35.43 tons, and was intended chiefly for the haulage of goods trains at a speed which may amount to 28 miles per hour on the level. The locomotive has six drivers, 51 in. diam., all in one frame. Each pair of wheels is driven by a 108 horse-power motor working with current at 320 volts and a frequency of 25 per second.

The Siemens-Schuckert Company's system has been applied to the Vienna-Baden Railway, where 14 motor cars are used for continuous and alternating current, each fitted with four 40 h.p. motors. On the Prussian State Railway to 6 motor cars, each fitted with two 123 h.p. motors. On the Rotterdam-Hague-Scheveningen line to 20 motor cars, each fitted with two 172 h.p. motors.

On the Parma Provincial Railway to 10 motor cars, each using 60 h.p. motors. On an eight-mile section of the Midland Railway.

They have constructed a motor vehicle with two motors, each 172 h.p. for the Oranienburg experimental line. They also have motors on cars running from Rome to Civita Castellana.

*Westinghouse System.*—The honor of being the first to overcome in a satisfactory and practical manner the great difficulties which presented themselves, at the outset, in the way of the adoption of simple alternating-current for traction, is indisputably the due of the engineers of the Westinghouse Company, and of Mr. Lamme in particular. Credit is also due to them for having undertaken the investigations which led up to the success now attained. The Westinghouse equipment comprises the following essential details: current collecting gear: one or two step-down transformers; the controller; the motors, usually four in number on each locomotive or automobile vehicle and the usual appliances for protection and safety.

To reduce the voltage from that of the distributing wire to that of the supply to the motors either one or two transformers are fitted on each vehicle; in the case of low power vehicles, the transformers are air-cooled in the case of high powers they are oil-cooled. In the case of the installations fitted in America, the cooling is generally effected by means of a strong air blast produced by an electric fan; this blast is also used to cool the motors. In all cases, the step-down transformers are auto-transformers; that is, they are single wound.

From three to six or even more contacts are taken from the

winding; the voltage at these varies progressively from 125 to 250 volts.

To start the motors and to regulate their speed, they are connected to these terminals so that current of a suitable voltage is supplied.

The single-phase Westinghouse motors are series wound with commutators and are compensated; they are generally wound for 250 volts.

The magnetic field of the field-magnets consists of rings of specially treated steel plate arranged inside the casing of the motor. The latter is of cylindrical form; it is of steel casting and cast in one piece; the end plates with the bearings are put on from each side and secured with heavy bolts.

The poles consist of projections on the sheet steel plates of the pole pieces; on the interior, the poles have channels cut in them parallel to the magnetic lines of force passing through them.

There are two field magnet windings; the first is similar to that of the series motors of a continuous current tramway; it consists of windings made on a former and fixed on the poles; the second is arranged parallel to the lines of force of the magnetic circuit; they are of insulated copper wire and go from one pole to the next; they are fixed in the channels in the poles.

The second winding of the field magnets automatically reduces the effects of self-induction in the armature, and this improves, as already described, the power factor of the motors by reducing the result of the reaction of the armature.

The armature is of drum type with channels; the core is formed of stamped sheet; large ventilating passages are arranged for in the design.

The armature coils are of copper bar bent to template and afterwards placed in the channels.

Special resistance of German silver, arranged at the bottom of these channels, are inserted between the armature coils and the segments of the commutator; they are connected to the coils on the opposite side to the commutator; they are carefully designed so as to avoid secondary currents, caused by variations in flux through the coils which are short-circuited which would cause sparking at the brushes and excessive overheating of the commutator.

On the opposite side to the latter, the armature carries equalizing rings which connect the points at equal potential; these rings divide the circuit in the armature coils equally even if the rotor gets out of centre; this uniform division of the current avoids flashing at the brushes.

The carbon holders are carried on a movable ring which can be moved and rigidly secured in any desired position.

The commutator, which consists of copper bars insulated from each other, is keyed to the armature shaft.

The bearings are carefully designed for giving a long life without abnormal wear.

The reduction is performed through a single or double train of gears. In America, in the case of motors on locomotives used for high speed on busy lines, direct driving has been used, the armature being fixed on the axle and the field magnets slung by springs from the bogie; the coupling is then effected by means of spring pins which engage with pockets formed in the centres of the wheels; this mode of driving is for example used on the big locomotives of 1,085 horse-power of the New York, New Haven & Hartford Railroad.

The Westinghouse Company has equipped some important lines in the United States and has constructed some remarkable locomotives. The rolling stock built by this company for single-phase current up to the present date (September, 1908) represents 70,000 h.p. and 310 miles of track. In Europe this company has supplied most of the equipment on the lines from Rome to Civita Castellana, 33½ miles; from Bergamo-Valle to Brembana, 18.6 miles; from Tergnier to Anizy, 19.6 miles; and it has also supplied a 24-ton trial locomotive to the Swedish State Railway. Its Manchester works also has

a vehicle of the automotor type in test on the trial line in Trafford Park.

*Finzi System.*—The Finzi system, which was worked by the Italian Electro-technical Union of Milan, is to-day amalgamated with the Westinghouse System, in consequence of the alliance between the Officine Elettrico Ferroviarie, which is a member of the Union, and the Westinghouse Company.

No complete line has been laid down except that of the Milan exhibition; the cars then working were, moreover, not fitted with the collector designed by Mr. Finzi in collaboration with Mr. Tallero. The Finzi-Tallero collector consists essentially of two contact rollers, connected by jointed arms, fitted with springs; it is very elastic and can be used, without being thrown over, for running in either direction, besides accommodating itself perfectly to variations in the height of the wire.

At Milan, the collector used was the Siemens bow; there were two of these per train. Each train consisted of four vehicles all automotors. One collector was fixed on each of the intermediate vehicles, the one being used for the outward journey and the other for the return; they were not automatic, and this gave rise to an accident owing to the forgetfulness of a driver who omitted to lower both when leaving work.

At Milan, the two end vehicles of each train were fitted with two motors and the intermediate vehicles with one only; hence there were six motors, all of equal power, per train arranged in two groups in parallel, each group consisting of three motors in series. There was a transformer at each end of the train, and each end vehicle was fitted with a controller. The electric connection between the vehicles was made by means of flexible cable. The two transformers were ordinary double-wound transformers; they reduce the voltage from 2,000 volts in the distributing wire to from 150 to 300 volts according to the position of the operating handwheel of the controller; they were used in rotation, that is to say, the one transformer was used when running in one direction and the other for the reverse.

The controllers were of the ordinary type made by the firm of Glöckner of Cologne; they consist of two cylinders, the one for reversing, the other for regulation; the latter enabled the voltage in the motor circuit to be varied by steps of 30 volts.

There were six motors, of the same type as that which had been under trial since 1903 in the works of the Unione Elettrotecnica Italiana and afterwards tested on one of the Edison Company's vehicles in Milan. After the first trials were made at Milan, where a considerable saving in current had been found, the Finzi system was tried on the Valtellina line, and this experiment is still in progress.

*The Thomson-Houston System.*—The Thomson-Houston Company does not claim other advantages for the single-phase system over those set forth by other manufacturers, but it claims that the repulsion motor, which it adopts, combines the advantages of the compensated series motor with those of the repulsion motor, *e. g.*, perfect commutation when running as in the case of the repulsion motor, as large a torque as with the series compensated motor, together with an excellent power factor. When the vehicles are required to run on both alternating and continuous current lines, a special switch enables all the necessary changes to be made in the connections by a single movement; an arrangement of rheostats is fitted to enable the vehicle to be started on continuous current by gradually diminishing the resistance in the usual manner.

An oil-bath transformer is used; this is specially designed to be fitted in the body of the vehicle; and is completely enclosed in a ribbed cast iron casing.

The coils are very carefully insulated so as to protect them from the vibrations to which the equipment of vehicles is necessarily subjected.

Contacts are provided corresponding to different voltages to

permit of graduating the speed of the motors. As previously stated, the Latour repulsion motor is used. The stator is exactly like that of an ordinary monophase induction motor; its winding is placed in the notches of a ring of plates. The rotor is a continuous-current armature; but there are two auxiliary brushes, short-circuited, and arranged at 90 deg. to the first brushes, then these brushes cause the current from the stator to pass through the rotor.

The motor circuit is protected by a cut-out with a fuse and a magnetic blow-out.

The master-controller is of the type used for continuous current where the multiple unit system is worked; it can be greatly simplified where, as in the case of the Malakoff line, the control is direct. In the first case the controller used, while it resembles that used on tramways both in appearance and mode of operation, is much narrower.

It can be fitted with a spring handle which automatically cuts off the current if the driver removes his hand. The function of the master-controller or manipulator, is only that of coupling up circuits of the contact-makers; consequently only the currents operating these electromagnets flow through it. All the apparatus which receives current of large quantity or high voltage is arranged under the floor of the body of the vehicle or in a special insulated compartment.

The British Thomson-Houston Company is building 16 motor cars for the South London Railway, these cars to be fitted with 4 motors each 113 h.p. The only other application of this system is that of the Malakoff line in Paris.

*Allgemeine Elektricitäts-Gesellschaft.*—This system, together with that of the firm of Siemens-Schuckert, is that which has been adopted for the largest number and the most important installations.

As in the case of the Thomson-Houston system, a compensated repulsion motor is used, designed in this case by Messrs. Winter and Eichberg.

The characteristic feature is the utilization of an auto-transformer for regulating and for the supply of current to the field magnets at a relatively high tension; this reduces the weight of the step-down transformers. The equipment comprises the following components; the collectors, the safety appliances, the transformers, the controlling gear, the motors and the accessories.

Usually there are two driver's cabins, one at each end. On the Blankenese-Ohlsdorf line, the vehicles consist of two portions connected in the manner usually employed on the local and inter-urban lines in Berlin; the one half only of each double vehicle is fitted with the collector gear; it comprises a cabin divided into two compartments reserved respectively for high and low tension; the other half is fitted with a compartment for low tension only. Similarly on the "Stubaital-bahn" one only of the two platforms is fitted with high-tension apparatus and this, moreover, is contained in a closed chamber. The reduction of voltage for the whole of the equipment is effected by a large oil-immersion transformer fixed in a corrugated iron box below the top of the underframe. Other transformers, which are air-cooled and receive current from the main transformer reduce the voltage of the current supplied to the armature of the motors and enable the speed to be regulated. Apart from the current for the driving motors, the main transformer furnishes current for lighting, heating, operating the compressed air pump (in cases in which this is electrically driven). The Winter-Eichberg motors have six poles or four poles with toothed armature with core of Martin steel in one piece; they are enclosed hermetically in a protective casing, with side inspection doors and covers near the brushes.

The first motors were intended for high-tension current to be used in the stator; in the new types all the current is transformed; the equipment is thereby increased in weight some 20 per cent., but the constructors think this is only a

slight disadvantage; the usual working voltage is from 500 to 850 volts.

The system of the Allgemeine Elektricitäts-Gesellschaft was first put in operation on the Stubaital line which runs from Fulpmes to Innsbruck, 11.3 miles. It was used also on the experimental work on the Hamburg-Altona line, and on the Borinage Local Railway, a single-phase system designed for a line 80 miles long. This company also has 50 sets of motors operating on the Blankenese Ohlsdorf line, and has supplied two motor cars to the Swedish State Railway for the purpose of testing the single-phase system under preliminary investigation before adopting electric traction. Each car is fitted with two Winter-Eichberg motors of 113 h.p. The stators are supplied direct at 6000 to 7000 volts. The good results obtained with these cars have led the Swedish government to decide for the adoption of the system for the Christiania-Drammen line.

The preceding data will, I think, enable a sufficiently good idea to be formed of the different modes of single phase traction in use at the present time in Europe. I have not thought it necessary to include in this short notice a description of the methods of Mr. Sahulka, or of the methods of Messrs. Auvert and Ferrand, since these systems have not at present been actually and practically worked.

The method of Messrs. Auvert and Ferrand is a current conversion method; it has been described in the *Revue générale des chemins de fer* for October, 1905; it has recently been tried between Cannes and Grasse on the Paris, Lyons & Mediterranean Railway.

#### ECONOMICAL DISTRIBUTION OF METAL IN THE SPLICE BAR.

BY MC'LEOD THOMSON.

The three types of splice bars illustrated by Figs. 1, 2 and 3 show an interesting distribution of metal. The bars shown by the last two figures have been prepared for the 75-lb. rail of one of the large western railways, and they are presented here as illustrating what can be done by a refinement of design and by bringing into use the latest thought along these lines.

Fig. 1 shows the angle bar which has been standard on the railway in question. Fig. 2 shows a reinforced form and Fig. 3 a girder bar of the latest type. The tabulated statement giving comparative data needs very little explanation in order to bring out the great advantages obtained by a proper distribution of metal. Careful analysis of these figures reveals almost all that can be said.

The moment of inertia of the section of a bar is approximately proportional to its stiffness, providing no part of the bar would buckle under load before the maximum fiber stresses are reached in its top or bottom portion. In Fig. 1 it is apparent that the outwardly extending foot portion of the bar tends to buckle up to the horizontal position long before the metal at the lower outer extremity exerts its full stiffening effect. In other words, in this design, the efficiency under load is determined by the buckling point rather than by the strength of the top and bottom fibers. It, therefore, follows that the foot, which should be very effective for stiffness on account of its being at a distance from the neutral axis, is really the least efficient.

In Fig. 2, it will be noted that nearly all of the metal is removed from the neutral axis and placed at the greatest distance from it in the form of an enlarged head and foot, also that the web joins the foot adjacent to its middle, in order to prevent the buckling which is characteristic of the ordinary angle bar design.

For comparative purposes, and in order to favor the old form shown in Fig. 1, let this buckling feature be eliminated, and let it be assumed that all the metal as distributed in Figs. 1 and 2 acts with equal efficiency in each bar. On this basis

the tabulated figures show that the moments of inertia of the two bars are 6.5 and 8.47 respectively, and that the moment of inertia of the rail is 22.4. This means that a bar as shown in Fig. 1 has 29 per cent. of the stiffness of the rail, while Fig. 2 shows a bar of 37 per cent. stiffness. It will also be noted that there is very little difference in the weight of these two bars, and that a pair 24 in. long as per Fig. 2 would be about 5.4 lbs. heavier than a pair of bars as per Fig. 1 and would have an increased stiffness of 28 per cent.

Fig. 3 shows a girder bar having a free depending flange. This flange raises the moment of inertia of a pair of such bars a trifle above that of the rail. The slightly angular form of the bars gives to them more flexibility and resiliency than the rigid T-rail form, and on this account the moment of inertia of them is not exactly proportional to their stiffness, or in other words, to the amount of deflection that would take place under load. The small excess in the moment of inertia of the bars above that of the rail is therefore desirable, in order to obtain a joint having about the same stiffness as the rail. The depending flanges of two bars weigh about nine pounds after their end portions are sheared off for tie clearance, and the upper portions, each having an area of 3.48 sq.

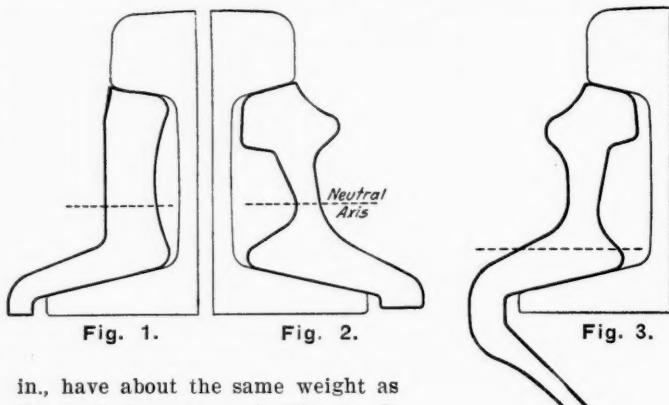


Fig. 1. Fig. 2. Fig. 3.

in., have about the same weight as the angle bar shown in Fig. 1. It therefore follows that about nine pounds of metal in the form of a depending flange increases the stiffness of a pair of bars from 29 per cent. to 103 per cent.

This increase in stiffness obtained by an economical distribution of metal, either in the reinforced angle bar or in the girder angle bar, saves a large amount of money spent in track maintenance. It tends to keep the rail ends up to a normal position, and therefore lessens the necessity for continually raising them by the expensive tamping method.

	Angle bars		
	Fig. 1.	Fig. 2.	Fig. 3.
Pair of	Pair of	Pair of	Pair of
Rail.	ordinary.	reinforced.	girder bars.
Area .....	7.6 sq. in.	6.56 sq. in.	9.5 sq. in.
Moment of inertia .....	22.4	6.5	8.47
Stiffness of rail .....	100.0 per ct.	29.1 per ct.	37.3 per ct.
Weight per ft. ....	25.0 lbs.	22.5 lbs.	25.2 lbs.
			32.8 lbs.

There has been a discussion in the Russian duma concerning the extent of what we would call the "knocking down" of railway fares by conductors and other train and station men. One speaker said that there was a regular organization among these men and the inspecting officers. When one of the latter is approaching, private signals are given from the locomotive, warning all trains moving in the opposite direction. He said that the matter had gone so far that a passenger with a ticket had become a novelty fit for a museum. Another speaker complained that many officials never paid for tickets, but assumed that the trainmen would not dare to enforce the regulations, in view of their rank. Another remarked that in one car there were 33 passengers without tickets; and one railway man was in possession of five different passes for his wife, and he was not a Mohammedan either.

## RAILWAY CAPITAL AND VALUES.\*

BY W. H. WILLIAMS,  
Third Vice-President, Delaware & Hudson Company.

(Continued from page 762.)

Railways maintain industrial bureaus, whose energy is concentrated on the location of new and enlargement of existing industries. As between two roads a decision will largely rest on the treatment of the patrons by the respective managements, so that the location of industries in towns served only by one line may be said to depend largely on the good will. At competitive points, and on through traffic passing over the line from one carrier to another, the rates being equal via each of the several roads, the routing of the freight over the intermediate carrier is dependent on service performed, etc., and is another evidence of the good will attached to the railway property.

Neither the property of a railway, nor any other property, is of any value without the right and ability to use it, and to obtain full value there must be the right and ability to use in the manner for which the property is best adapted.

In purchasing any completed railway property at a price greater than the cost thereof of material in place, the additional amount is the capitalization of the good will or business opportunity. Can we deny to one carrier a right that is given another?

In an address delivered at Minneapolis last December, Hon. Robert H. Shields, who was then, and is now, the president of the Michigan Tax Commission, criticised the work of Messrs. Cooley and Adams, in Michigan, and the following expression of opinion is especially worthy of repetition:

"The pendulum of unequal taxation in Michigan, so far as the railways are now concerned, has already pretty nearly swung the return limit, and a strict adherence to this theory in assessing Michigan railways, considering the methods employed in assessing other property, would not only not be a square deal, but would mean nothing more nor less than confiscation."

In 1900 Professor Adams allowed an annuity of 4½ per cent. on the engineer's estimate of the then present cost of reproduction of the physical property of the Michigan Central, and he capitalized the non-physical property at 6 per cent.

In 1902 Professor Adams used lower rates of valuation for the Michigan Central, viz., 3½ per cent. for physical and 5 per cent. for non-physical, thus by a change in interest rate increasing in two years the value of the Michigan Central to the extent of \$20,000,000. On such a basis, as the valuation for taxes increases, the returns to the stockholders would decrease.

The 1900 figures were based on the operations for ten years, while the 1902 figures were based on the operations for five years, the latter in 1902 giving the higher valuation for taxation.

As to the result of the work in Wisconsin, I have the following information regarding one of the electric railways:

## Valuation of physical property:

New .....	\$9,000,000
Present condition .....	7,000,000
Cost of property to present holders.....	19,600,000
Securities outstanding (par value).....	18,000,000

Valuation for taxation by Wisconsin State Board of Assessment .....

..... 17,000,000

on which taxes for 1908 will be, approximately, \$200,000, or about 6¼ per cent. of the gross earnings.

While they are required to pay taxes on a valuation of \$17,000,000, an effort is now being made by the public authorities to have the passenger rates reduced on the basis of the \$7,000,000 estimated value of the physical property in its existing condition.

Ordinarily we should expect to see the valuation for taxation much less than the valuation used as the basis for making rates, or for capitalization. Generally speaking, the valuation of property for taxation should be its market value, regardless

of the purpose for which it is used. Capitalization should represent the cost of the property to the present holders thereof. The valuation for rates is dependent, among other things, both upon the first cost and the present value as a "going concern."

The following decision by the Circuit Court of the United States for the Southern District of New York in the Consolidated Gas Co. v. the City of New York, is of interest:

## "PROPERTY INVESTED—FRANCHISES.

"Under the settled rule of decision, however, that if property protected by a franchise is condemned and wholly taken from its owner, the franchise must be paid for, such a state regulation reducing the earning power of property so protected reduces the value of the franchise *pro tanto*, and the complainant is entitled to add the value of its franchises, if ascertainable, to its capital account before declaring the rate of return permitted by the statute.

## "PROPERTY INVESTED—VALUATION OF FRANCHISES.

"Complainant having followed the universal custom of American corporations, sanctioned by law, of capitalizing its franchises on its organization by issuing stock in excess of its actual investment in tangible property, and having since then earned fair dividends on all its stock, the amount of such excess stock may fairly be taken as the value of its franchises at the time of issuance, and where its business has largely increased, such value may be assumed to have increased since that time in proportion to the increase in the value of its tangible property.

## "PROPERTY INVESTED—TITLE TO FRANCHISES.

"Where complainant on its organization purchased the property and franchises of existing gas companies, and has since enjoyed and operated under such franchises, it acquired the legal ownership thereof under the decisions of the Court of Appeals of New York, and, notwithstanding the fact that the original grantees have ceased to exist, it is, for the purposes of an inquiry into the legality of a state statute regulating its rates of charge, entitled to capitalize their value, especially where the state has, during such time, compelled it to pay a franchise tax based thereon."

Based on the company's capitalization of its franchises in 1884, as \$7,781,000, the court ruled that under conditions existing in 1905 the franchises were worth over \$12,000,000, on which it was entitled to a return of 6 per cent. This is equivalent to about 26 per cent. of the estimated worth of the tangible property, excluding all property not directly operated by the company. The almost vital difference in the method of valuation is best understood by the following quotation from the decision in the Consolidated Gas case:

"As to the realty, the values assigned are those of the time of inquiry; not cost when the land was acquired for the purposes of manufacture, and not the cost to the complainant of so much as it acquired when organized in 1884, as a consolidation of several other gas manufacturing corporations.

"It is objected that such method of appraisement seeks to confer upon complainant the legal right of earning a fair return upon land values which represent no original investment by it, does not indicate land especially appropriate for the manufacture of gas, and increases apparent assets without increasing earning power. Analogous questions arise as to plant, mains, services and meters; the reported values whereof are the reproductive cost less depreciation, and not original cost to the complainant or its predecessors.

"It appears by undisputed evidence that some of these last items of property cost more than new articles of the same kind would have cost at the time of inquiry; that some are of designs not now favored by the scientific and manufacturing world, so that no one now entering upon a similar business would consider it wise to erect such machines or obtain such apparatus. In every instance, however, the value assigned in the report is what it would cost presently to reproduce each item of property, in its present condition, and capable of giving service neither better nor worse than it now does. As to all of the items enumerated, therefore, from real estate to meters, inclusive, the complainant demands a fair return upon the reproductive value thereof, which is the same thing as the present value properly considered. To vary the statement: Complainant's arrangements for manufacturing and distributing gas are reported to be worth the amounts above tabulated if disposed of (in commercial parlance) 'as they are.'

"Upon authority, I consider this method of valuation correct. What the court should ascertain is the 'fair value of the property being used' (Smyth v. Ames, 169 U. S., at p. 546; 18 Sup. Ct., at p. 434; 42 L. Ed., 819); the 'present' as compared with 'original' cost; what complainant 'employs for the public convenience' (169 U. S., at p. 547; 18 Sup. Ct., at p. 434; 42 L. Ed., 819); and it is also the 'value of the property at the time it is being used' (San Diego Land Co. v. National City, 174 U. S., at p. 757; 19 Sup. Ct., at p. 811; 43 L. Ed., 1154). And see, also, Stanislaus Co. v. San Joaquin Co., 192 U. S., 201; 24 Sup. Ct., 241; 48 L. Ed., 406. It is impossible to observe this continued use of the present tense in these decisions of the highest court without feeling that the actual reproductive value at the time of inquiry is the first and most important figure to be ascertained, and

\*An address before the New York Traffic Club.

these views are amplified by *San Diego Land Co. v. Jaspar* (C. C.), 110 Fed., at page 714, and *Cotting v. Kansas City Stock Yards* (C. C.), 82 Fed., at page 854, where the subject is more fully discussed. Upon reason, it seems clear that in solving this equation the plus and minus quantities should be equally considered, and appreciation and depreciation treated alike. Nor can I conceive of a case to which this procedure is more appropriate than the one at bar. The complainant, by itself and some of its constituent companies, has been continuously engaged in the gas business since 1823. A part of the land in question has been employed in that business for more than two generations, during which time the value of land upon Manhattan Island has increased even more rapidly than its population. So, likewise, the construction expense, not only of buildings, but of pipe systems under streets now consisting of continuous sheets of asphalt over granite, has enormously advanced.

"The value of the investment of any manufacturer in plant, factory, or goods, or all three, is what his possessions would sell for upon a fair transfer from a willing vendor to a willing buyer, and it can make no difference that such value is affected by the efforts of himself or others, by whim or fashion, or (what is really the same thing) by the advance of land values in the opinion of the buying public. It is equally immaterial that such value is affected by difficulties of reproduction. If it be true that a pipe line under the City of New York of 1907 is worth more than was a pipe line under the city of 1827, then the owner thereof owns that value, and that such advance arose wholly or partly from difficulties of duplication created by the city itself is a matter of no moment. Indeed, the causes of either appreciation or depreciation are alike unimportant, if the fact of value be conceded or proved; but that ultimate inquiry is oftentimes so difficult that original cost and reasons for changes in value become legitimate subjects of investigation, as checks upon expert estimates or bookkeeping inaccurate and perhaps intentionally misleading. Cf. *Ames v. Union Pacific R. R.* (C. C.), 64 Fed., at pages 178, 179. If, fifty years ago, by the payment of certain money, one acquired a factory and the land appurtenant thereto, and continues to-day his original business therein, his investment is the factory and the land, not the money originally paid; and unless his business shows a return equivalent to what land and building, or land alone, would give if devoted to other purposes (having due regard to cost of change), that man is engaged in a losing venture, and is not receiving a fair return from his investment, i. e., the land and building. The so-called 'money value' of real or personal property is but a conveniently short method of expressing present potential usefulness, and 'investment' becomes meaningless if construed to mean what the thing invested in cost generations ago. Property, whether real or personal, is only valuable when useful. Its usefulness commonly depends on the business purposes to which it is or may be applied. Such business is a living thing, and may flourish or wither, appreciate or depreciate; but, whatever happens, its present usefulness, expressed in financial terms, must be its value.

"As applied to a private merchant or manufacturer, the foregoing would seem elementary; but some difference is alleged to exist where the manufacturer transacts his business only by governmental license—whether called a franchise or by another name. Such license, however, cannot change an economic law, unless a different rule be prescribed by the terms of the license, which is sometimes done. No such unusual condition exists here, and, in the absence thereof, it is not to be inferred that any American government intended, when granting a franchise, not only to regulate the business transacted thereunder, and reasonably to limit the profits thereof, but to prevent the valuation of purely private property in the ordinary economic manner, and the property now under consideration is as much the private property of this complainant as are the belongings of any private citizen. Nor can it be inferred that such government intended to deny the application of economic laws to valuation of increments earned or unearned, while insisting upon the usual results thereof in the case of equally unearned, and possibly unmerited, depreciation."

The court quoted numerous decisions upholding its decision that in determining the reasonableness of a rate the valuation to be used is that of a "going concern," and not such a valuation as is now suggested by the Interstate Commerce Commission. That Congress has recognized that franchises have value is proven by section 20 of the Act to Regulate Commerce, which provides for showing in the annual reports of the railway companies "the cost and value of the carrier's property, franchises and equipments." Therefore, to have amended the La Follette bill so as to meet the views of the commission, would have provided for a valuation, the use of which as the basis for rates would be unconstitutional.

The injustice of the Commission's plan as a basis for determining the reasonableness of a rate, or fixing the capitalization of a railway, is best understood when considered in connection with the manner in which the present railway systems have come into existence.

Originally the roads were built with varying gages for track;

some being less and others more than the present standard, and owing to the sparsely settled territory traversed by the railway, the first cost of the line was kept down to the minimum.

The development of the traffic and the construction of competing lines necessitated improved facilities and more economical operation. This caused the roads to be rebuilt as standard gage lines, and the purchase of rolling stock of greater capacity (thus necessitating the purchase of additional right of way), the widening of cuts and fills, and the purchase of new ties, bridges, rolling stock, etc. For the light capacity rails there have been substituted rails 85 to 100 lbs. per yard. Wooden trestles have either been filled with earth and rocks or have given place to iron bridges, or to stone or concrete arches. The single-track line has been superseded by systems of two, three or four main tracks.

The cost price of a line originally built with a 0.3 grade line would be less than to first build it with a grade of 1 per cent., and subsequently reduce this under traffic to 0.3. The first cost of a line originally built as double-track would be less than to first build one track and subsequently relocate all or a portion of it in the building of a second main track. The ultimate first cost is also greater where the line is originally built with temporary structures and small equipment, which later gave way to permanent structures and modern equipment.

Had the government in the early days undertaken to require the railway companies to build their lines in accordance with the modern standards, the small amount of traffic then moving would not have been sufficient to have paid a reasonable return on the investment, and the building of the railways and the development of the country would have been delayed for many years. Also, there was so much uncertainty regarding the traffic that the financial risk in connection with the construction of the railways was materially greater than that of ordinary commercial pursuits, and to attract investors it was necessary to sell the bonds at a substantial discount. In some cases, stock was offered as a bonus with bonds, and the value thereof may be considered as a discount on securities sold. Whether it be cash or stock, the discount represented the commercial risk. As this risk decreased, the value of the property as a "going concern" increased, until the increased value of the terminals and right of way, and the value of the franchises, good will, etc., more than offset the par value of the securities originally issued on account of the commercial risk.

To now readjust the securities on the basis of "present cost of material in place" is to ignore the risks assumed by those to whom the country is obligated for the great development of the transportation systems (as well as the country), and is to place on an equality with them, companies entering the railway field to-day who do not assume such great risks, and who are not responsible in any way for such development.

In 1848, the chief engineer of the Pennsylvania Railroad estimated the cost of right of way from Harrisburg to Pittsburgh, 245.8 miles, at \$154,294. How much has the Wabash paid for right of way into Pittsburgh alone?

The right of way of the Chicago & North-Western for the new passenger depot at Chicago involved the paying of \$6,697,236 for land not half a mile long. Following the construction of the subways in New York city, and the several tubes under and bridges over the rivers, the market value of property in certain sections has increased three and four-fold in from two to five years. These are not isolated cases, nor do they apply only to the large cities. It is probably even more true in the smaller towns, the prosperity of which is almost wholly dependent on the success or failure of one or two industries, and the prices of land fluctuate accordingly. Can it not be said, therefore, without fear of contradiction, that the appreciation of railway property has more than offset any discount on securities sold?

Three purposes to be served by a physical valuation have been advanced. These are:

- (1st) The fixing of taxation,
- (2d) The enforcement of reasonable rates, and
- (3d) The control of financial operations.

#### TAXATION.

Railway property is not directly taxed by the federal government and is not subject to such taxation. Any interference with this subject on the part of the federal government is therefore an unconstitutional interference with a matter reserved wholly to the several states. If this were not so, the impossibility of using the valuation of the Interstate Commerce Commission for purposes of state taxation is disclosed by a study of the diverse conditions existing in separate states. The charters of some of the companies make them exempt from taxation. In some states the basis of valuation for taxation is other than the physical property, or its value as a "going concern." In Connecticut it is the value of the capital stock, funded debt and floating indebtedness; in Delaware the number of passengers carried, net earnings, equipment, and the cash value of capital stock; in Maine, the gross receipts; in Massachusetts, the capital stock; in Pennsylvania, the capital stock and franchises; in Maryland, Minnesota and Wisconsin, the gross earnings. The constitutions of the several states provide the manner in which the valuation of property for taxation shall be ascertained, and usually this is determined by a state board of taxation or local assessors, and these powers can neither be delegated to another state commission such as the railroad commission, nor to a federal commission such as the Interstate Commerce Commission. What assurance have we that the laws of the several states will be changed so as to make use for taxation purposes of a valuation of the railways such as is proposed? Certainly so far as its use for this purpose is concerned, the valuation ought not to be undertaken until the state constitutions have in this respect been changed.

#### RATES.

Although the President did suggest ascertaining whether a valuation of the railways could be made, he has expressly disclaimed having much confidence in its utility. In his speech at Indianapolis, he said:

"At the outset, let it be understood that physical valuation is no panacea; it is no sufficient measurement of a road. . . ."

Similarly, Hon. Charles A. Prouty, a member of the Interstate Commerce Commission, in an address delivered before the National Association of Manufacturers, on May 22 last, said:

"The popular impression that if the value of our railways were known it would be easy so to adjust rates that a fair return upon that value, and only a fair return, would be obtained, is entirely erroneous."

"Fair value" of the carriers' property must be the "basis of all calculations as to the reasonableness of rates," said the Supreme Court of the United States in *Smyth v. Ames*, and in *Franklin County v. Nashville, Chattanooga, etc., Railway*, afterward quoted with approval (see *Columbus Southern Railway v. Wright*, 151 U. S., 470, 479) by the Supreme Court of the United States, the Supreme Court of Tennessee said:

"The value of the roadway at any given time is not the original cost, nor, *a fortiori*, its ultimate cost after years of expenditure in repairs and improvements. On the other hand, its value cannot be determined by ascertaining the value of the land included in the roadway assessed at the market price of adjacent lands, and adding the value of the cross-ties, rails and spikes."

In *Cleveland, Cincinnati, Chicago & St. Louis Railway v. Backus*, the Supreme Court of the United States said:

"But the value of property results from the use to which it is put, and varies with the profitability of that use, present and prospective, actual and anticipated. There is no pecuniary value outside of that which results from such use." (154 U. S., 445.)

Turning to *Smith v. Ames* (169 U. S., 546), the elements of fair value are found fully enumerated in the following significant paragraph:

"We hold, however, that the basis of all calculations as to the reasonableness of rates to be charged by a corporation maintaining a highway under legislative sanction must be the fair value of the property used by it for the convenience of the public. And, in order to ascertain that value, the original cost of construction, the amount expended in permanent improvements, the amount and market value of its bonds and stock, the present as compared with the original cost of construction, the probable earning capacity of the property under particular rates prescribed by statute, and the sum required to meet operating expenses, are all matters for consideration, and are to be given such weight as may be just and right in each case. We do not say that there may not be other matters to be regarded in estimating the value of the property."

Nothing could be clearer than that this "fair value" is not the aggregate obtained resulting from a physical inventory. For "original cost of construction," "the amount expended in permanent improvements," "amount and market value of bonds and stock," have nothing whatever to do with the idea of fair value; and "probable earning capacity under particular rates prescribed by statute," and "the sum required to meet operating expenses," have but the most remote and indirect bearing upon such idea. Indeed, it is evident that, realizing the potential injustice of rigorously applying either method of valuation, irrespective of the special circumstances surrounding particular cases, the court intended to establish a permanent rule which would protect valuations specially adapted to the requirements of each case which should arise. Therefore, it enumerated the principal classes of facts, both historical and contemporaneous, which might affect the problem of justice in valuation, and, carefully adding that the list was not intended to be exhaustive, declared that each must "be given such weight as may be just and right in each case."

We have already seen that the courts have ruled that in determining the reasonableness of a rate the cost to the present holders, as well as the present value of the property as a "going concern" must be ascertained. In none of the decisions has the court held that the present "value of the material in place" can be used as the valuation for determining the reasonableness of a rate. No valuation, however, can become the sole basis for the making of rates.

Given two roads between New York and Buffalo—one may be fifty miles shorter than the other; one four tracks and the other single track, the first approximately four times as valuable and fifty miles longer; one with 70-ft. grades handling fifteen cars to the train, the other with water grades hauling fifty cars to the train. Physical operation and physical construction are obviously the controlling factors in cost, but so long as the cost of operation does not exceed the gross earnings, even these are disregarded in meeting competition. Physical valuation will not eliminate distance or grades or make the country flat where now are mountains. On the other hand, it will tend to eliminate competition. The terminals of the Pennsylvania Railroad in and about Greater New York are probably worth as much as the entire line New York to Philadelphia. In the determination of rates following physical valuation, it is hardly conceivable that they would be required to charge double the rate of their competitor without any New York terminals; or even permitted to charge double, for then what shall the competitor charge? If an average between the two or of all lines be taken, it will be too large for one road and not enough for another. To use the cheaper line as the basis might prevent a fair return on the cost of the other.

Under the ruling of the courts, each case must be determined on its own merits, and each rate in itself proven unreasonable for the service performed before a reduction therein can be ordered. This makes it necessary to first determine the proportion of the value of the property as a "going concern" to be assigned to its business as a common carrier, and then assign the proper proportion to passenger

and freight service. The assignment as between passenger and freight service must necessarily increase and decrease as the proportion of either to the total increases or decreases. It cannot, therefore, be considered a permanent factor, but will vary from year to year and from season to season, and with the volume and flow of traffic, so that which would be a reasonable assignment under conditions existing to-day would not necessarily be reasonable under conditions existing to-morrow. Having, for example, determined for the freight traffic such assignment of valuation, it is then necessary to classify the same as between interstate and intrastate business; then into local and through traffic; then into the various classes of commodities handled. The revenues and cost of operation must likewise be classified to determine the net returns from the particular service performed. This is an almost impossible task. Take two roads traversing the same territory and under the same management, over only one of which are fast passenger trains operated—it must set its track up for higher speed, but who can determine the increased cost of maintenance of track that should go to passenger service?

Hancock has said that the tariff is a local issue. It can be claimed with greater force that the question of freight rates is a local issue. The New England States, which depend on other sections of the country for raw materials, such as wool, cotton and leather necessary for their industries manufacturing cotton and woolen goods, and boots and shoes, would welcome the elimination of the tariff on the raw materials, while fighting for the retention and possibly an increase of the tariff on the finished products. For similar reasons western Pennsylvania would favor the elimination of the tariff on all wearing apparel, while insisting on the retention of the tariff on iron and steel products. The South, formerly strongly opposing all tariffs, now wants retained the tariff on cotton (and on wool, which competes with cotton), because of its enormous cotton industry. Oregon and Washington favor the tariff on lumber because of their immense forests, and in like manner each section of the country favors a tariff on the articles produced therein, while insisting on the repeal of the tariff on articles secured from other sections of the country. The same is true regarding the railway freight rates, and the present tendency is to counteract rather than to ascertain the cause.

To-day, England handles the commerce of the world, not because it is cheaper, for example, to carry freight from the United States to England and thence to South America than it would be to carry it direct from the United States to South America, but because of the regular and frequent service established between the ports of England and the other great ports of the world and the absence of such direct regular service to and from ports of the United States. The South can sell little, if anything, to Panama, not because the cost of production is more than in the Central and New England States, but because there is no established steamship service between any southern port and Panama, while such service does exist between New York and Panama, and this necessitates greater cost to the South in placing its products f. o. b. at the seaboard.

In the development of a community there are factors of equal or greater moment than rates:

DEVELOPMENT OF MANUFACTURING CENTER.—The location of a manufacturing center is dependent upon the location of the raw materials, and the market for the finished product; the facilities for assembling the raw materials and distributing the product; the labor market, etc.

This can best be illustrated by a case recently called to my attention. Noting the great development of the rubber trade, and the success of the factories at Akron, Ohio, some gentlemen of another city built what was then considered to be the most up-to-date factory for the manufacture of rubber goods. It cost about \$250,000. For a long time, however, it was

found impossible to secure skilled operatives; the men claiming that they could get as good wages at Akron, and in event of one plant closing down, work could be secured at one of the others, whereas, were they to enter the employ of the new plant it would be necessary for them to return to Akron in event the new plant closed down for lack of orders. Difficulty was also experienced in marking the goods. Everyone knew of the rubber plants at Akron, and the high quality of the output. It was therefore easy to market rubber manufactured at Akron. No one had heard of the manufacture of rubber at the other place, and were unwilling to buy any considerable quantity of an article regarding the quality of which so little was known. The gentleman told me it was fortunate that the stockholders were wealthy men, as these two facts had necessitated a further expenditure of \$500,000 to place the plant on a sustaining basis.

(To be continued.)

#### RAIL BREAKAGES ON "AN INFERIOR SUB-GRADE."

The following letter from A. G. Wells, General Manager of the coast lines of the Atchison, Topeka & Santa Fe, addressed to J. W. Kendrick, Vice-President, is self-explanatory:

"Reading an address made by Charles B. Dudley on 'Some Features of the Present Steel Rail Question,' delivered at the annual meeting of the American Society for Testing Materials, at Atlantic City, in June last, I was struck with a statement that there are indications that rail failures are a question of geography; that the same rail with the same locomotives and cars, and the same density of traffic, will have far less failures if the sub-grade is sandy, porous and well-drained than if the sub-grade is dense, heavy clay, which tenaciously holds water and for quite a portion of the year may be called a more or less modified mudhole.

"With this statement in mind I had some figures made of our rail breakages, the conditions being of the kind referred to by Doctor Dudley. From Seligman to Barstow our track is laid with eighty-five pound rails; the density of the traffic is practically the same over every foot of it. Between Yucca and Barstow, a distance of 227 miles, the sub-grade is sandy, porous and well-drained; between Yucca and Seligman, a distance of ninety-one miles, the sub-grade is largely clay, of a kind that holds water. From November, 1907, to October, 1908, we had eighty-three rail breakages on the territory first named, or a percentage of .001; on the other stretch we had in the same period seventy-two breakages, the percentage being .0025. Or, in other words, where the sub-grade was dense and more or less clay, the breakages per mile were just two and one-half times greater than where the sub-grade was sandy. This is interesting and tends to prove that Doctor Dudley's theory is right."

The paragraph in Dr. Dudley's address, to which Mr. Wells refers, is as follows:

"The sub-grade is the foundation and as such is unquestionably one of the most important elements in the problem. No amount of money spent on rails, ties, splices and ballast will give successful results on an inferior sub-grade. Our belief is that the importance of the sub-grade has not been sufficiently appreciated by engineers in the past. Indeed there are indications that rail failures are a question of geography. The same rail, with the same locomotives and cars, and the same density of traffic, will have far less failures if the sub-grade is sandy, porous and well drained, than if the sub-grade is dense, heavy clay, which tenaciously holds water, and, for quite a portion of the year, may be called a more or less modified mud hole. The great enemy of the trackman is water, and our firm belief is that if more study had been put on the problem of keeping water out of the sub-grade fewer rail failures would have characterized the past."

## RAILWAY RATES AND MERCANTILE PRICES.

The rates of the so-called transcontinental lines to "intermediate points"—that is, to places between the Missouri river and the Pacific coast—have long been the subject of criticism because they are in many instances higher from eastern points than are rates to Pacific coast terminals. A traffic bureau was organized recently at Salt Lake City, Utah, to get "fairer" rates for that city. In reply to complaints against "intermediate" rates in general, and those to Salt Lake City in particular, J. A. Reeves, General Freight Agent of the Oregon Short Line, has written a notable open letter, the reasoning of which is of widespread interest and application. From Mr. Reeves' letter the following extracts are taken:

"The present adjustment of tariffs to, from and within Utah, and the intermountain country generally, is the result of years of negotiation among groups of shippers and groups of railways, beginning when the railways were built here, continuing to the present time and certain to continue as long as the railways run and commerce and manufacturing are carried on. This must be so because in the beginning the make up of the tariff is the result of compromise among varying views and interests, which are affected in diverse ways by the general level of rates maintained or by the adjustment as to particular commodities, and further because no tariff that ever was, or ever can be, built will continue to meet the changing necessities of commerce for any certain length of time. Imperfect in the beginning, because it is a compromise and fully meets the views of no one, its features, one by one, because of changing conditions or alterations in the rate adjustment elsewhere, become absolute and must be continually revised in order to serve the purpose for which the tariff is intended.

"While not wishing to be understood as claiming perfection for the basis here, I am willing to go on record as saying that, all conditions considered, it is as fair and defensible as will be found anywhere, whether we go to competitive or non-competitive territory for comparison, or whether we speak of through rates in and out of this country or of the local tariffs carrying rates within our immediate jurisdiction. \* \* \*

"Not all that we would like to do has been done. Much yet remains. Much is continually under negotiation in a growing country like this, where new conditions spring up daily. Much, probably, which many will think we should do, we will remain unable to accomplish, because we also have our bounds and limitations, and even when our views coincide with theirs we are not always able to convince others or to win over diverse interests to see as we do.

"It is not fair, though, to denounce us and discredit our sincerity in such wholesale fashion as is sometimes done, nor is it encouraging to the conscientious railway representative, who is trying to do the best he can, to appreciate and live up to his responsibilities and his opportunities to act for the general welfare while serving his own. No one has or no one needs a broader understanding of the interdependence of the transportation company and its patrons than the up-to-date railway traffic man of to-day, and I am speaking not of we who live here in Utah any more than of much-maligned superiors who do not live here, but who lend ready consideration of any feasible proposition advanced by us. None of us claim perfection, for we are human, and so liable to misjudge and to err; nor do we claim to be philanthropists or believe it is expected that we will be, but we do think we should be given credit for realizing that no permanent prosperity can come to us unless those we serve and with whom we work are prosperous, and we cannot but feel that much of the criticism with which we are so indiscriminately assailed is thoughtless and unreasonable. Either it is so or our efforts have proved unavailing and our lives are failures.

"Much of that criticism, however, I believe to be based on entire misconception of facts and conditions. Imperfections

and inequalities probably exist in our rate basis here, or may hereafter develop, and it will from time to time have to be modified and corrected as to some features, but if the whole structure is to be assailed as wrong and indiscriminately condemned on the one ground that rates to more distant points, the coast, for example, are lower on some commodities, then let me say that that adjustment rests on a principle not only recognized and indorsed by the interstate law itself, but repeatedly confirmed by the Interstate Commerce Commission and the courts—a principle which is the very groundwork and foundation of our entire commercial fabric and enters into every transaction going on every day in every city and every state of this union. I refer to the principle of profit averaging. That is a part and parcel of every business, railway and every other business as understood to-day could not exist without it, be it this or any other business.

"Some illustrations follow in which it must not be understood that I assume to be accurate to the cent. Some of the low profits referred to may not be as low as stated. Some of those referred to as being high may not be as high as given, or they may be higher, but the principle as stated is true and is known to be true by every man of business. We all know that no business is carried on at one dead level of profit. The spread is wide between the least profitable and the most profitable business done. It is the average to which the concern looks for results. The illustrations given below might be multiplied indefinitely until they would embrace every business, large and small, because the same universal principle underlies and governs them all. Those who condemn the railways for these practices, which, as I have stated, are according to law and endorsed by those who enforce the law, are doing the same thing. They are not criticised for it, nor should they be, for it is a business law. They could not do any other way, yet it is the 'terminal' rate, lower than the intermediate rate, which we hear harped upon continually as the great unpardonable sin of the railway, and the very ones whose profits run from 5 per cent. down on some transactions and from 50 per cent. up on others are the same ones prone to demand that a transportation company's lowest profit shall be searched out and set as the maximum and the measure of its entire operations.

"The fourth, or 'long and short haul' section of the interstate law reads as follows:

"Section 4. That it shall be unlawful for any common carrier subject to the provisions of this act to charge or receive any greater compensation in the aggregate for the transportation of passengers or of like kind of property, under substantially similar circumstances and conditions, for a shorter than for a longer distance over the same line in the same direction, the shorter being included within the longer distance. Provided, however, that upon application to the commission appointed under the provisions of this act, each common carrier may, in special cases, after investigation by the commission, be authorized to charge less for longer than for shorter distances for the transportation of passengers or property, and the commission may from time to time prescribe the extent to which such designated common carrier may be relieved from the operation of this section of the act."

"Such is the law under which we operate, and which has been interpreted to permit lower charge to points where competition exists, not only water competition, but any competition of a compelling or controlling nature; of market, for example, or of other railways under certain circumstances. Any who doubt this will gladly be given an opportunity to examine records of the decision. The higher intermediate rate is to be challenged, if at all, on the ground of its own unreasonableness, not merely by citing some terminal rate which may be lower. The railway business is not done at one dead level of profit, and in order to show that this is not peculiar to the railway business, a few illustrations will suffice. As stated, the figures given are claimed to be approximate, not accurate

to the cent, but the principle they exemplify is absolute; it is the averaging of profit.

"A furniture dealer's profit probably runs from 10 per cent. on a common kitchen chair to 100 per cent. on more expensive furniture.

"A hardware dealer sells nails by the keg at something like 5 to 10 per cent. profit, and charges 20 per cent. and upward on a kitchen range.

"A grocer sells sugar costing him 95 cents for \$1, and he sells the same customer or the next customer fancy pickles costing him 50 cents for \$1.

"Any storekeeper sells for the same price goods delivered ten to thirty blocks away that he charges for the same goods purchased over the counter and carried away by the customer. When delivery is necessary he absorbs the cost of it to meet his competition.

"A freight allowance is a reduction made by a manufacturer or jobber in the net price of his goods to meet the price made by a competitor located nearer the point of delivery. The profit on the goods is shrunk to that extent to meet the competition.

"And so do all dealers equalize profits, according to the commodity or the conditions surrounding it or the distance at which the business is done or the proximity or extent of competition.

"The Utah sugar factory sells its product at a small profit at Chicago at a larger profit in Nebraska, and at the largest profit at home in Utah. Sugar factories the world over are operated on the same plan. It is the only plan on which they could be operated on any large scale.

"The Utah fruit and vegetable canner sells for delivery near at home at a higher rate of profit than he will accept, and must accept for the same product, meeting competition in distant markets. At times of surplus production the excess is sold very close, sometimes at an actual loss. The same is true of any other manufacturing business.

"The Utah candy manufacturer makes his highest profit in Utah cities. When he invades competitive fields in other states he shrinks his profits to equalize the competition he finds there. If the narrower margins on which he must do business there were made the maximum he might earn anywhere, he would quit the competitive field.

"And so do all manufacturers average profits. A small business can be done at the higher returns yielded by the home market. The volume will depend upon the extent of the market. This having been supplied, it is possible to reach out and contest competitive fields with rival concerns at a reduced rate of profit, which would not pay were it made the measure of all the business done.

"A railway company hauls a car of low-grade ore cheaper than it will haul a car of high grade of the same weight over the same rails for the same distance. It shrinks its profit to enable the low-grade business to move. It hauls a car of ice or rough stone or scrap iron for a lower rate than it will haul the same weight of some other equally heavy commodity the same distance. The cost of haulage is the same and the profit to the railway is different.

"A railway company hauls business into markets subject to water competition for less than it will haul the same tonnage a less distance to markets not subject to water competition. It makes the rate necessary to meet the competition of the cheaper carrier, or to equalize the producer on its own line with some other producer served by the cheaper carrier. It does this, not because it desires to, but because it must if it and the producer served by it are to hold their share of the business there. In so doing it figures that its line is in existence and must be maintained whether this additional and highly competitive business is accepted or not, and it shrinks its profit to secure this business for itself and the industries served by it to an extent that it could not afford were that to be made a basis and a measure of all its revenues.

"If the law were to select the cheap business of any concern and decree that would set the maximum or serve as the measure of all its transactions, then the cheap business would have to be abandoned. No concern could live under such a rule. Such business is done on a basis which, volume considered, and fixed charges (which remain the same whether volume is large or small) considered, renders it narrowly profitable and justifies accepting it at a level made necessary by conditions surrounding it, but which would prove disastrous and impossible if applied as a measure to the entire business done.

"The law of average is immutable and applies to every business concern in the world, be it large or small. A railway is a quasi-public business concern. It must serve all shippers alike under similar conditions, and the law imposes that. The railway must recognize the law and obey the law, but the law and those who enforce it realize that there are conditions which neither the law nor the railway can change, and these must receive consideration in interpreting the railway's obligations. Beyond that point the railway is a business concern, governed and affected by the same contingencies and the same business principles that govern and affect any other business concern. One of these is the law of average. There is business which it must accept, if it accepts it at all, on the basis of a low rate of profit. It may, in connection with other business, and considering that a certain large portion of fixed expense must be met, whether the cheap business is accepted or not, yield a small return. It is not in itself a loss, else it would not, knowingly, be done, but the net result, were the price at which it is performed made the measure of all business, would be a loss. Were that condition imposed the cheap business would be surrendered. 'Surplus' transportation would go to waste, to the benefit of nobody, but to the distinct harm of the carrier, and also of the industries dependent on the carrier for an outlet to competitive markets.

"Freight rates are but one of many determining factors in cost of living. This may be easily demonstrated by inquiry. For instance, all stations on the lines of the Oregon Short Line, San Pedro and Denver & Rio Grande railways from Ogden to Payson, inclusive, are known as 'Utah common points,' and take the same freight rates from various territories, but, notwithstanding Salt Lake City and Ogden ship much more extensively in carloads and hence obtain goods from other markets at a less total freight cost, it will be found that the cost of living is much less in the smaller cities. Moreover further inquiry also will undoubtedly demonstrate that there are certain points in other states where all freight rates are higher than to Salt Lake City, where the cost of living is less.

"We are glad at all times to confer with our patrons regarding rate matters. It is essentially to our interest that they should be as prosperous and do as large a business as possible. In that lies the measure of our own success. We shall be glad to meet with them and discuss the details of their grievances, lending the best efforts at our command toward reaching a solution. We do not want them to feel that they are at war with us, or we with them."

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Baron Goto, who has made a reputation as an administrative officer on Manchurian railways and in the great island of Formosa, is now the Japanese Minister of Transportation, a position of great importance since the private railways have been acquired by the state. The railway system is now divided into four groups, each with a separate operating management, there being about 4,650 miles in all. The manager under the minister is Baron Hirai, who has long been president of the old and much smaller system of state railways. The new organization is said to be in accordance with European practice.

## General News Section.

On Thursday, April 1, the office of the New York State Public Service Commission in New York city received no complaints—the first day on which such a record has been made since the establishment of the commission in July, 1907. The office usually receives an average of 16 complaints a day.

The use of street cars with self-contained power supply is again to be tried in New York City. F. W. Whitridge, Receiver of the Third Avenue (surface) Railroad Co., is to try a storage battery car and a gasolene motor car on some one of the short lines in his charge which are now operated by horse cars.

The project to build in New York city a monorail line, which was announced some weeks ago by the owners of the street railway extending from Bartow to City Island, now worked with horses, has now progressed one stage farther, the Board of Estimate and Apportionment having given its assent to the construction of the proposed line.

The report, recently published, that the railways have relaxed their rule forbidding shippers and others to affix advertisements to freight cars is unfounded. The American Railway Association has taken no action recently. Its only rule relating to sizes of placards is that which deals with cards used by the railways themselves to show destinations, classes, etc.

At Washington, April 2, the Car Service Committee of the National Association of Railroad Commissioners held a conference with representatives of the American Railway Association and other interested parties on the question of uniform car service and demurrage rules. The meeting was called by Interstate Commerce Commissioner Lane, who is Chairman of the committee.

The Superintendent of Public Works of New York State has reported to the Senate that the outlets from Cayuga and Seneca Lakes can be improved so as to connect the lakes to the barge canal for less than \$6,000,000. The estimate of the State Engineer is \$8,000,000. Such improvements would add 20 miles of canal and 80 miles of natural deep water to the canal system and make it possible to shorten the rail haul of coal from the Pennsylvania fields.

Mayor Busse of Chicago has had prepared for introduction in the Illinois Legislature a bill to give the city government of Chicago power to prescribe by ordinance the motive power by which cars or trains may be operated within the city limits. The proposed legislation takes the form of a bill to authorize any city or village to exercise this power. Under similar legislation Chicago and some other cities in Illinois have compelled track elevation within city limits.

The officers of the Interborough Rapid Transit Co., New York, who have made a good deal of objection to having side doors in the cars of the subway, as prescribed by the State Public Service Commission, (*Railroad Age Gazette*, Feb. 26, page 418) are proposing to try a train of cars with doors in the center of the side. This is the arrangement which has long been used in Boston and the officers of the Interborough claim that it will be much more convenient than to have side doors near the end of the car.

The New York Central & Hudson River has sent to the Department of Agriculture a claim for \$36,544 for the cost of disinfecting stock cars and stock pens, on the order of the Department, on the occasion of the epidemic of foot and mouth disease last autumn. At the Agricultural Department it is said that if a claim of this nature is allowed, it will make a precedent under which the government can be made liable for millions of dollars, orders of this kind having been issued many times in connection with epidemics of Texas fever and other cattle diseases.

The Chicago & Alton having adopted for its sleeping cars wash bowl arrangements by which passengers who clean their teeth on the cars will be less offensive to other passengers,

other roads will, of course, have to do something; the New York Central has them on certain trains, but the enterprising Canadian Pacific has gone the Alton one better; it provides not only the separate dental wash bowl, but also will provide paper tumblers, coated with paraffine, so that each passenger can have a fresh "glass." The "glass" is to be thrown away after being used.

The American Bankers' Association, which hopes to get the Interstate Commerce Commission to forbid express companies to do banking business, declares that the express companies are unfairly and unjustly competing in the banking business. They can carry their own money from place to place practically without cost, and they deposit their money in banks in such a way as to compel the banks to make unnecessary shipments of money for the advantage of the express company; in small towns the express agents keep an insufficient supply of currency and tell the holders of money orders to get them cashed at the banks, thus imposing a loss on the banks; the express companies unfairly compete with the banks by under-bidding in the business of exchange, and by keeping their agencies open longer hours than the custom of bankers will permit; and they discount foreign bills, with bills of lading attached, at rates with which the banks cannot compete, because of the favorable shipping arrangements enjoyed by the express companies.

The Adams and American Express companies have disposed of their stock in the United States Express Co., and their representatives have resigned from the board of directors of the U. S. company. Thomas C. Platt and associates are said to be the purchasers of the 20,000 shares of stock, giving them control of a majority. According to the *Wall Street Journal* they seem to have had control heretofore without owning a majority, by virtue of the anomalous character of the organization; it is a joint stock association, organized in 1854, and there is no requirement that an annual meeting shall be held. This being so, the original officers have had no trouble in continuing their control. The changes now going on, like those in other express companies during the past two years, have been brought about in consequence of the requirements in the way of publicity which have been imposed by the Interstate Commerce law, as amended in 1906. Certain stockholders of the United States company, who have been complaining because of insufficient dividends, are continuing their efforts to secure changes in the management of the company. They will try to have a bill passed by the New York legislature to give them the usual privileges of stockholders of corporations, and will try to force a meeting for the election of officers. The annual report of the company for the year ending last June showed gross earnings of \$17,000,000 and net earnings of only \$37,000. The company has been paying 4 per cent. dividends on \$10,000,000 stock. The management is understood to aver that the company's business is being managed in the most profitable way possible. A number of its contracts with railways are unprofitable.

### Electric Operation on the New Haven.

The preliminary plans for the further electrification of the New York division of the New York, New Haven & Hartford between Stamford and New Haven are under consideration by the company's board of directors, but the work will probably have to wait until the income of the road revives; and the newspaper reports which say that the work will be finished within two years appear to be founded on the guesses of the reporters. The company's records show that electric operation between Stamford and New York is attended by 3 per cent. fewer delays than under steam operation. The cost of operation on this short line is higher under electricity than under steam, but, with extension, the estimates of the experts of the company indicate that the operation can be brought down to a parity with steam or below. A high officer of the

company can be quoted as saying that the next logical step is the application of electricity to freight business on the New York division. This would require large additional power and a different type of electric engine from that used in the passenger service. One of the first features of electric extension would be the erection of a power plant between New Haven and Bridgeport, but the report that the company has already bought land for this purpose is not confirmed.

#### Seven Canadian Presidents.

At a dinner given in Montreal on February 12, there were present representatives of seven international associations residing in Montreal, as follows: W. J. Camp, President of the Association of Railway Telegraph Superintendents; William McNab, President of the American Railway Engineering and Maintenance of Way Association; H. H. Vaughan, President of the American Railway Master Mechanics' Association; J. H. Callaghan, President of the Railway Storekeepers' Association; James Powell, President of the Society of Railway Club Secretaries; C. H. Gould, President of the American Library Association, and G. T. Bell, President of the American Association of General Passenger and Ticket Agents. The meeting was presided over by Mr. Bell, whose association is 54 years old.—*Official Guide*.

#### New York-Chicago Fast Run.

Excluding stops, the special train which was run from New York to Chicago in 16½ hours on March 28, as reported in our last issue, page 763, made an average speed of a trifle over a mile a minute for the whole distance. By a misprint the number of cars in the train was given in our report as five, while in fact it was four. Their estimated weight, as before stated, was 210 tons (one car, 60 tons; three cars, 50 tons each). Slight inaccuracies having occurred in the telegraphic report of the time record, we reprint it with corrections below:

Left New York yards (March 27) . . . . .	11:40 p.m.
Arrv. Albany (March 28) . . . . .	2:15 a.m. = 137 miles
Left Albany . . . . .	2:19 "
Arrv. Syracuse . . . . .	4:55 " = 148 "
Left Syracuse . . . . .	5:03 "
Arrv. Buffalo yards . . . . .	7:35 " = 149 "
Left Buffalo . . . . . (Central time)	6:41 "
Arrv. Cleveland . . . . .	9:25 " = 183 "
Left Cleveland . . . . .	9:27 "
Arrv. Toledo . . . . .	11:21 " = 108 "
Left Toledo . . . . .	11:24 "
Arrv. Elkhart . . . . .	1:23 p.m. = 133 "
Left Elkhart . . . . .	1:26 "
Arrv. Chicago . . . . .	3:10 " = 101 "

Total distance . . . . . 959 miles

Actual time consumed 16 hours 30 minutes. Deducting the time lost in making the passenger stops at Scarborough and at Englewood (five minutes each), and the time changing engines, a total of 36 minutes, leaves the running time 15 hours and 54 minutes, equal to 60.31 miles an hour. The rate of speed from Toledo to Elkhart was 67.06 miles an hour, the official distance being 133 miles.

#### Control of Stock and Bond Issues in Kansas.

The Legislature of Kansas has passed and the governor has signed a radical law to give the State Railroad Commission power to control the issuance of railway securities. The act declares that the power to create liens on property of common carriers situated within the state is a special privilege, and provides that no corporation transacting the business of a common carrier in Kansas, whether organized under the laws of the state or not, shall hereafter issue any stock, stock certificates, bonds or other evidence of indebtedness which shall or may become a lien upon its property in the state payable in more than one year from date unless and until permission shall have been obtained from the Railroad Commission. Any securities issued for property or service shall be void if the value placed upon the property or service by the company be substantially more than that stated in the application. Common carriers are prohibited from declaring any stock, bond or scrip dividends or dividing the proceeds of the sale of stock, bonds or scrip among stockholders.

#### Chicago Harbor Development, Lake Traffic and the Railways.

The Harbor Commission makes this broad generalization, that two sorts of things are needed in a big city, that is, a "city" or "commercial" harbor for the local demands, local consumption, and all that; and an "industrial" harbor for the demands of the industries, the factories, that consume the coal and iron ore and other raw materials, and at this same industrial harbor would be handled all produce passing through the Chicago "traffic gateway." It would be just as objectionable to attempt to handle that class of traffic in the center of a busy city as it would be to have the railway freight yards occupying valuable ground down town and having that class of business crowding our streets.

On the lakes as a whole, iron ore and minerals, other than coal, represent 58 per cent. of the total tonnage handled. The next most important commodity handled on the lakes is coal, hard coal representing 5 per cent. and soft coal 19 per cent. The next is grain and grain products, 7 per cent. Lumber represents 3 per cent.; it used to be much greater, but the lumber that is tributary to the lakes is rapidly being cut away. That is true even in the Canadian forests. This leaves unclassified 8 per cent.

At Chicago the unclassified freight represents a somewhat larger percentage, and these coarser commodities a smaller percentage. At Chicago it is between 11 and 12 per cent., but that 11 or 12 per cent. while small in volume is very important in value. The class of vessels handling the coarser commodities like iron ore, coal and lumber are vessels which are specially built and designed, with unloading machinery for handling these particular commodities. The only coarse products now handled in Chicago are lumber and grain. These can be handled just as well at or near the Calumet district.

The smaller and faster boat is the boat for quick despatch of merchandise. Boats 350 to 400 ft. long do practically all the work between New York and points along Long Island Sound and New England. They are not building any 600 ft. boats down there to handle that class of business.

I said to you that the percentage of miscellaneous articles handled here was small in comparison to the whole, but very important in value. Government officials estimate the average value of miscellaneous cargoes going through the "Soo" canal at \$150 per ton. Using that as a fair valuation for traffic of that class handled here, we get the enormous total of \$260,000,000 of that class of business handled annually at Chicago.

I suppose I owed my position on the Harbor Commission to the fact that I was a railway man, and I was therefore looked to for preparing the paragraph on the relations of the water facilities here to the railways. This is what the Commission finally accepted on that subject:

"An important reason for favoring harbor improvements for Chicago and indorsing a general waterway development is the influence which water routes have and probably always will have upon railway service and rates. Without intending disparagement or criticism of railway service or rates, it is generally recognized that water routes give the community they serve a valuable alternative means of transportation. Were water routes lacking it is probable that the geographical advantage of this community would be lost by the railways putting all communities, regardless of size or importance, on a parity. There is a tendency to base rail rates on distance and cost of service. The chief and only well recognized exception is when rail rates are affected by the competition of water transportation." This tendency is noted in various decisions of the Interstate Commerce Commission, and in distance tariffs published by the various states.

Chicago, to maintain its pre-eminence and the advantage which it gains from its geographical location, should never lose sight of the importance of its water gateway, even though the actual tonnage handled by water may not amount to more than 5 per cent. of the total business done.

There is no doubt that water transportation will always affect railway rates in a very important way, and assuming that railways will always be permitted to earn a fair return on the capital invested I think the tendency will usually be that the rates made to points where there is water transportation will be *below* the average; and rates made to points where there is no water transportation will be *above* the

average. In other words, the inland point far away from water and not having the advantage of water transportation will have to pay a little more than its share, because the railway has to compete at the point where there is water transportation. That might not be a very good argument for waterway development at an inland town, but I believe it is the truth.—Extracts from an address by F. A. Delano, President of the Wabash, before the City Club of Chicago, April 3, 1909.

#### The School of Railway Signaling.

This institution, established in Utica, N. Y., about a year ago, now has 10 instructors and is teaching over 300 students. These students are scattered over the United States and Canada. The school has received numerous inquiries from all over the world.

A complete course in signaling is given, covering every feature of the subject. Hundreds of letters have been received from students all over the country expressing their satisfaction with the instruction they are receiving. The school's General Agent, M. W. Shuler, is representing the school on the road, and reports a promising future for it in all the states he has visited. The course offered by the school is explained in a 20-page catalogue, which is sent on request.

The President of the school, H. C. Williams, was Supervisor of Signals on the Harlem division of the New York Central, where he started a night school for the benefit of the men in his department. The idea was at once successful, and when Mr. Williams was promoted to the Mohawk division he started a night school at Utica; and this was the beginning of the present vigorous institution. The school was incorporated in February of last year and began giving systematic instruction by mail on the first of July following.

#### Accuracy in Reports.

When the fender of a car on the City Railway of Dayton, Ohio, picked up a young heifer at the corner of Third and Jersey streets the conductor, filling out the report blank and answering the question, "What did the victim say?" wrote: "She was carried along on the fender for a short distance, then rolled off and run away without saying a word." Which recalls the Irish section master's report of his disposition of the carcass of a cow—not a young and wild heifer—that was killed by a train: "Disposition—*mild and gentle*."

#### Want a Job?

If you do, listen to the words of an old passenger traffic manager down east. "How did I reach my present position? Well, sir, I aimed for it, right from the start. I knew it was somewhere along the rocky road I had started on, and I was just bound to have it. I began when I was 15 years old. I ran errands, I emptied waste baskets, I carried mail, I did whatever 'most anybody told me to do. Hard? Certainly. And I wasn't perfect, by any means. I had all a boy's joy in a day off, and there were times when I hated work. My grandmother died once or twice, and now and then she was frightfully sick. But something happened always to set me straight again. Once, I remember, I was studying the slow, hard system of shorthand they had in those days. I was often tired, for I was growing; I wasn't overly strong, and there was plenty for me to do, so I had a spell of the blues. The General Passenger Agent rang for me, and, fishing around in what looked like a tremendously fat pocket-book, finally selected from a bunch of cards which I knew to be passes, one which he told me to take to the office of another road, and tell the chief clerk to please issue a duplicate, spelling his name right. Something in my wondering eyes at the wealth he held right there made him laugh; and he said, 'Don't stare so, for when you have this office, you'll have more passes than these, I tell you that.'

"More?" I stammered. "Why, yes," he said, "for there will be more railways by that time." My blues vanished for that time, and I never lost hope or expectation from that time on until I got where I am. Yes, I worked deucedly hard, and

I do yet. But I would have had to work at anything I did, you see."

That's it—the aim. Bound to hit somewhere near the mark if you aim carefully enough.

You must like the job well enough so that you won't look at the clock more than three times in ten minutes when the shadows begin to get long. The business must seem enough like your own for you to pick scraps off the floor, set a chair straight, answer a chance-met visitor with some appearance of courtesy, speak well of the boss and his enterprise when among strangers. And finally there are three rules that every youngster just beginning would do well to commit to memory. They are appended.

1. Take a personal interest in the business.
2. Take a personal interest in the business.
3. Take a personal interest in the business.

—*North Western Bulletin.*

#### Museum of Safety and Sanitation.

The following officers have been chosen: Acting President, Philip T. Dodge; Vice-Presidents, Charles Kirchhoff, T. C. Martin, Prof. F. R. Hutton and R. W. Gilder; Director, Wm. H. Tolman. The Museum of Safety and Sanitation is in the Engineering Societies' building, 29 West 39th street, New York. The objects are to promote means and methods of safety and sanitation and the application thereof to any and all public or private occupations, with a view to lessening the number of casualties and avoiding the causes of physical suffering and of premature death.

#### American Society of Civil Engineers.

At the meeting held on April 7 a paper on "The Sixth Street Viaduct of Kansas City," by E. E. Howard, Assoc. M. Am. Soc. C. E., was presented for discussion.

#### St. Louis Railway Club.

At the meeting on April 9, H. Wade Hibbard, Professor of Mechanical Engineering at the University of Missouri, will present a paper on "Organization." There will also be a demonstration of autogenous welding by oxy-acetylene.

#### Mechanical Engineers.

A meeting of mechanical engineers living in and near Boston is called for Friday evening, April 16, at 8 o'clock, in the auditorium of the Edison Electric Illuminating Company, 39 Boylston street, Boston, Mass. A plan for holding in Boston meetings of the American Society of Mechanical Engineers, for the reading and discussion of papers, similar to those held in New York, will be discussed. This meeting has the approval of the American Society of Mechanical Engineers.

#### Chicago Railway Club.

At a meeting of the Chicago Railway Club on April 2 it was decided to continue the temporary officers, whose names were given in our issue of April 2, page 765, until a meeting on May 3, when election of permanent officers for the ensuing year will be held. About 250 applications for membership have been received. The chief clerks' clubs of the North Western, the Illinois Central and the Rock Island have been merged in the new organization.

The executive officers of the roads entering Chicago are taking much interest in the club and giving it their support. Its main purpose is to bring about closer relations between the officers and chief clerks of the various departments of railway service. The executive officers regard this as a very desirable object and many of them have applied for membership. These include: W. E. Bailey, W. B. Biddle, Geo. H. Crosby, J. N. Faithorn, S. T. Fulton, C. M. Hyzer, J. W. Kendrick, Gardner Lathrop, Frank Nay, Geo. T. Nicholson, W. J. Black, W. B. Kniskern, R. H. Aiston, John Sebastian and others. Those who are active in the formation of the club

desire it to be understood that it is in no way competitive with the Traffic Club of Chicago, the Western Railway Club, or other such organizations. It is designed to occupy a field that has heretofore been unoccupied in Chicago. It will be educational as well as social, and will have addresses by men prominent in the transportation business. The house committee is seeking permanent quarters and has some propositions under consideration. The temporary headquarters for business purposes are at 10 Sherman street, Chicago.

#### International Railway Fuel Association.

C. T. Malcolmson, Briquette Engineering Expert for the Roberts & Schaefer Co., is to read a paper on "Briquetted Coal As a Railroad Fuel" at the first annual meeting of the International Railway Fuel Association, which will be held at the Auditorium Hotel, Chicago, June 21 to 23, inclusive. Mr. Malcolmson was in charge of the work of briquetting coal at the United States government fuel testing plants at the Louisiana Purchase and the Jamestown expositions, and later has been in charge of the construction of the briquetting plant of the Rock Island Coal Mining Co. at Hartshorne, Okla.

#### MEETINGS AND CONVENTIONS.

*The following list gives names of secretaries, dates of next or regular meetings, and places of meeting.*

AIR BRAKE ASSOCIATION.—F. M. Nellis, 53 State St., Boston, Mass.; May 11-14, 1909; Richmond, Va.  
 AMERICAN ASSOCIATION OF DEMURRAGE OFFICERS.—A. G. Thomason, Scranton, Pa.; May 11; St. Louis, Mo.  
 AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS.—R. W. Pope, 33 West 39th street, New York; second Friday in month; New York.  
 AMERICAN RAILWAY ASSOCIATION.—W. F. Allen, 24 Park Place, New York; May 19, 1909; New York.  
 AMERICAN RAILWAY BRIDGE AND BUILDING ASSOCIATION.—S. F. Patterson, B. & M., Concord, N. H.; Oct. 19, 1909; Jacksonville, Fla.  
 AMERICAN RAILWAY ENGINEERING AND MAINT. OF WAY ASSOC.—E. H. Fritch, Monadnock Bldg., Chicago.  
 AMERICAN RAILWAY MASTER MECHANICS' ASSOCIATION.—J. W. Taylor, Old Colony Bldg., Chicago; June 16-18, 1909; Atlantic City.  
 AMERICAN SOCIETY OF CIVIL ENGINEERS.—C. W. Hunt, 220 W. 57th St.; N. Y.; 1st and 3d Wed., except July and August; New York.  
 AMERICAN SOCIETY OF MECHANICAL ENGINEERS.—Calvin W. Rice, 29 W. 39th St., N. Y.; 2d Tues. in month; annual, Dec. 7-10; New York.  
 AMERICAN STREET AND INTERURBAN RAILWAY ASSOCIATION.—B. V. Swenson, 29 W. 39th St., New York.  
 ASSOCIATION OF AMERICAN RAILWAY ACCOUNTING OFFICERS.—C. G. Phillips, 143 Dearborn St., Chicago; April 28, 1909; Cincinnati.  
 ASSOCIATION OF RAILWAY CLAIM AGENTS.—E. H. Hemus, A. T. & S. F., Topeka, Kan.; last week in May, 1909; Detroit, Mich.  
 ASSOCIATION OF RAILWAY TELEGRAPH SUPERINTENDENTS.—P. W. Drew, Wisconsin Central Ry., Chicago; June 23-25, 1909; Detroit.  
 ASSOCIATION OF TRANSPORTATION AND CAR ACCOUNTING OFFICERS.—G. P. Conard, 24 Park Pl., New York; June 22-23; Montreal.  
 CANADIAN RAILWAY CLUB.—James Powell, Grand Trunk Ry., Montreal, Que.; 1st Tues. in month, except June, July and Aug.; Montreal.  
 CANADIAN SOCIETY OF CIVIL ENGINEERS.—Clement H. McLeod, Montreal, Que.; irregular, usually weekly; Montreal.  
 CENTRAL RAILWAY CLUB.—H. D. Vought, 95 Liberty St., New York; 2d Friday in January, March, May, Sept. and Nov.; Buffalo.  
 FREIGHT CLAIM ASSOCIATION.—Warren P. Taylor, Rich., Fred. & Pot. R.R., Richmond, Va.; June 16, 1909; Old Point Comfort, Va.  
 INTERNATIONAL MASTER BOILER MAKERS' ASSOCIATION.—Harry D. Vought, 95 Liberty St., N. Y.; April 27-30, 1909; Louisville, Ky.  
 INTERNATIONAL RAILWAY FUEL ASSOCIATION.—D. B. Sebastian, La Salle St. Station, Chicago; June 21-23, 1909; Chicago.  
 INTERNATIONAL RAILWAY GENERAL FOREMEN'S ASSOCIATION.—E. C. Cook, Royal Insurance Bldg., Chicago; June 1-5; Chicago.  
 IOWA RAILWAY CLUB.—W. B. Harrison, Union Station, Des Moines, Ia.; 2d Friday in month, except July and August; Des Moines.  
 MASTER CAR BUILDERS' ASSOCIATION.—J. W. Taylor, Old Colony Bldg., Chicago; June 21-23, 1909; Atlantic City.  
 NEW ENGLAND RAILROAD CLUB.—G. H. Frazier, 10 Oliver St., Boston, Mass.; 2d Tues. in month, ex. June, July, Aug. and Sept.; Boston.  
 NEW YORK RAILROAD CLUB.—H. D. Vought, 95 Liberty St., New York; 3d Friday in month, except June, July and August; New York.  
 NORTH-WEST RAILWAY CLUB.—T. W. Flanagan, Soo Line, Minn.; 1st Tues. after 2d Mon., ex. June, July, Aug.; St. Paul and Minn.  
 RAILWAY CLUB OF PITTSBURGH.—J. D. Conway, Pittsburgh, Pa.; 4th Friday in month, except June, July and August; Pittsburgh.  
 RAILWAY SIGNAL ASSOCIATION.—C. C. Rosenberg, 12 North Linden St., Bethlehem, Pa.  
 RAILWAY STOREKEEPERS' ASSOCIATION.—J. P. Murphy, Box C, Collinwood, Ohio; May 17-19; Chicago.  
 ROADMASTERS' AND MAINTENANCE OF WAY ASSOCIATION.—Walter E. Emery, P. & P. U. Ry., Peoria, Ill.; Nov., 1909; Washington.  
 ST. LOUIS RAILWAY CLUB.—B. W. Frauenthal, Union Station, St. Louis, Mo.; 2d Friday in month, except June, July and Aug.; St. Louis.  
 SOUTHERN ASSOCIATION OF CAR SERVICE OFFICERS.—J. H. O'Donnell, Bogalusa, La.; April 15; Atlanta, Ga.  
 SOUTHERN AND SOUTHWESTERN RY. CLUB.—A. J. Merrill, Prudential Bldg., Atlanta; 3d Thurs., Jan., April, Aug. and Nov.; Atlanta.  
 TRAVELING ENGINEERS' ASSOCIATION.—W. O. Thompson, N. Y. C. & H. R. R.R., East Buffalo, N. Y.; September, 1909; Denver.  
 WESTERN CANADA RAILWAY CLUB.—W. H. Rosevear, 199 Chestnut St., Winnipeg; 2d Mon., ex. June, July and Aug.; Winnipeg.  
 WESTERN RAILWAY CLUB.—J. W. Taylor, Old Colony Bldg., Chicago; 3d Tuesday each month except June, July and August; Chicago.  
 WESTERN SOCIETY OF ENGINEERS.—J. H. Warder, Monadnock Bldg., Chicago; 1st Wednesday, except July and August; Chicago.

## Traffic News.

The Spokane & Inland Empire Railroad, on March 31 and April 1, 2 and 3, ran its second annual "fruit special demonstration train" through the Palouse country and Spokane valley, giving lectures to the fruit raisers.

Ten railways in Oklahoma have appealed to the state supreme court against the order of the State Corporation Commission requiring a reduction of 30 per cent. in freight rates on crude oil. The proposed reduction is alleged to be confiscatory.

Complying with the recent order of the government, the Grand Trunk, on April 2, began running third-class passenger cars, one each day each way, between Montreal and Toronto, with tickets at 2 cents a mile. On the first trip from Montreal the car had no passengers; on the return it had three as far as Cobourg.

Bates & Chesebrough announce at San Francisco the establishment of a fleet of four sailing vessels to run regularly between New York and San Francisco, carrying freight at from 30 cents to 35 cents per 100 lbs., or considerably lower than the rates by the Pacific Mail Steamship Co. The time allowed for a trip is 120 days.

The executive officers of the Missouri lines have announced to the state officials of Missouri that they have finally determined to put in effect on April 10 the passenger rates and mileage tickets that they offered at a conference with the state officials on March 25 as a basis of compromise. (*Railroad Age Gazette*, April 2, page 771.)

The transcontinental railways will ask the federal courts to restrain the Interstate Commerce Commission from enforcing its order in the Spokane rate case. W. W. Cotton, General Attorney of the Oregon Railroad & Navigation Co., is quoted in an interview at Portland as definitely announcing that his road will contest the decision. There is no doubt but that the other roads affected will unite with it in this action.

Passenger tariffs showing local fares at 2½ cents a mile were put in effect by the principal railways of Virginia on April 1, in accordance with the recent decision of the State Corporation Commission. Four companies still maintain the 2-cent rate, the order of the Commission not applying to their lines. These are the Richmond, Fredericksburg & Potomac, the Chesapeake & Western, the Louisville & Nashville and the New York, Philadelphia & Norfolk. The Virginian Railway, only recently opened for passenger traffic, had voluntarily put in effect a tariff based on the 2-cent rate.

Judge Kohlsaat, of the United States Circuit Court, sitting at Chicago, has set April 12 as the date for arguments in the suit brought by the Chicago, Milwaukee & St. Paul to restrain the Interstate Commerce Commission from enforcing its order requiring this railway to restore certain joint coal rates. The rates in question formerly were in effect jointly over the Chicago, Indiana & Southern and the St. Paul. The St. Paul canceled them because they were unremunerative to it. The Commission ordered them restored at the instance of the Cardiff Coal Co., which desires to ship coal from its mines in Northern Illinois to points in the Northwest on the St. Paul's lines. The litigation raises important questions regarding the power of the commission. The St. Paul says that it amply serves from mines on its own road all the needs of the various coal consuming communities on its lines and can haul the coal to such communities from these mines without sharing revenue from the traffic with any other line; that to require it to haul coal on joint rates from Illinois mines would materially diminish its revenues and make it an instrument for reducing to a considerable extent the sale of coal produced by mines on its own lines; and that the commission has no power to establish through rates and joint rates except—in the language of the law—"when that may be necessary to give effect to any provision of this act," and then only when no reasonable or satisfactory through route exists, which, the St. Paul asserts, is not the case here. The commission denies the right of a railway to refuse to open its lines to a shipper off its rails, because shippers on its rails

can supply the demand for their product; denies that the fact that the revenues of a carrier may be reduced by the requirement that it make rates for the transportation of the product of certain shippers is a sufficient reason for its refusal to put in such rates, and contends that the refusal of the St. Paul to make joint rates for the coal of the Cardiff Coal Co. constitutes such a discrimination against that company as justifies the commission in ordering the road to restore the rates in question.

#### INTERSTATE COMMERCE COMMISSION.

##### Fuel Wood as Emigrants Movables.

*J. B. Place v. Toledo, Peoria & Western et al. Opinion by Commissioner Clark.*

Fuel wood may lawfully be included in a carload of emigrant movables under a tariff which permits including limited quantities of lumber and fence posts, and also "property included in the outfit of intending settlers." Reparation awarded.

#### STATE COMMISSIONS.

The Erie Railroad has been ordered by the New York State Public Service Commission, Second district, to run one train each way daily over the Conesus Lake branch from Conesus Lake Junction to Lakeville, Livingston county. During the summer there is satisfactory train service, but in the winter there are no passenger trains run and Lakeville is left without means of transportation except by traveling to the main line of the Erie, a distance of two and a half miles, by highway.

The Railroad Commission of Maryland has issued a new distance tariff on soft coal, applying between all stations in the state. The rate per ton of 2,000 lbs. for 5 to 10 miles is fixed at 30 cents. For every additional five miles up to 150 miles the rate increases 1 cent, the rate for 15 miles being 31 cents, for 20 miles 32 cents, etc. For distances of 155 to 195 miles the rate increases from 5 to 10 cents per ton for each additional five miles, being 60 cents for 155 miles and \$1.40 for 195 miles. For distances of 200 to 400 miles the rates increase irregularly as the distance increases, being from \$1.50 for 200 miles to \$2.15 for 400 miles.

The New York Public Service Commission, Second district, has issued an order requiring the railways operating in the Adirondack forest preserves to use oil-burning locomotives from April 15 to November 1, between the hours from 8 a.m. to 8 p.m. All locomotives in service between 8 p.m. and 8 a.m. during these summer months, other than oil-burning locomotives, must have a certificate from the commission permitting them to operate. The complete installation of oil-burning engines is to be effected by April 15, 1910, and at least two locomotives on the Mohawk & Malone railway and two on the Delaware & Hudson must be fitted with oil-burning apparatus and placed in service not later than July 15, 1909. Further, it is ordered that none but oil-burning locomotives shall be used after June 1, 1909, except those inspected by the commission and given a certificate, revocable at the pleasure of the commission. These orders were issued with a view to preventing fires in the forest preserves.

#### Wisconsin: Commission's Relation to Common Council.

*C. F. Lang et al. v. City of La Crosse and the La Crosse City Railway.*

Complaint alleging that an ordinance, allowing the respondent railway to abandon and take up its tracks on a certain street in the city of La Crosse and providing for an extension to take the place of said abandoned track, is unreasonable. Such track was taken up prior to the filing of the petition.

The commission has no authority to authorize the construction or extension of any electric railway within a city or prevent the abandonment or change of location of any part of such a road constructed under a franchise granted by the common council, if the council's consent has been obtained. Petition is therefore dismissed.

#### COURT NEWS.

The Indiana Supreme Court rendered a decision on April 2 holding that the law conferring the rate-making power on the Indiana Railroad Commission is constitutional. The decision was rendered in a case in which the Southern Indiana and the Baltimore & Ohio Southwestern appealed from an order of the commission fixing joint rates on coal.

The suit of the government to compel a dissolution of the Standard Oil Co., which was begun in November, 1906, has now reached its last hearings, the argument of the government having been heard by the Circuit Court in St. Louis this week. F. B. Kellogg, of St. Paul, Chief Counsel for the government, filed a brief filling 198 printed pages, and going fully into the history of the company and its predecessors.

In the United States Circuit Court of Appeals at New Orleans April 6 the injunction ordered by Judge Jones in the United States District Court at Montgomery restraining the Alabama State Railroad Commission from putting certain rates into effect was dissolved. The opinion was agreed to by Justices Shelby and McCormack. Justice Pardee dissented. The litigation grew out of the law of 1907, which provided for a maximum passenger rate of 2½ cents a mile and a material reduction of freight rates.

The Department of Justice at Washington announces that the decree rendered on April 3 in equity suit No. 870, United States vs. Northern Pacific et al., pending in the district of Montana, is in favor of the government. This suit was instituted on July 19 of last year to cancel patents issued for 1,120 acres of coal land. The Northern Pacific held title to 1,120 acres of land in the Mount Rainier National Park, created by the act of March 2, 1899. Section 3 of the act provided that the Northern Pacific might deed to the government any lands held by it within either this national park or the Pacific forest reserve and select in lieu thereof an equal quantity of non-mineral public lands. The railway company selected the 1,120 acres of land in controversy and received patents therefor. At the time of such selection these lands were classified as non-mineral lands. It developed later that they were valuable coal lands. This suit was instituted to cancel the railway's patent for the lands on the ground that they were valuable coal lands, their value being alleged to be more than \$100,000,000.

#### Supreme Court on Kentucky Rate Law.

The Supreme Court of the United States in a suit appealed by the State Railroad Commission of Kentucky has this week held that, in making a general tariff for all of the railways of the state, the commission had exceeded its powers, and the decision is in favor of the defendant railway, the Louisville & Nashville. The case was an application for an injunction to restrain the enforcement of an order of the commission of June 20, 1906, fixing rates on intrastate business. It came to the Supreme Court on appeal from the United States Circuit Court for the Eastern district of Kentucky, which held unconstitutional the Kentucky statute known as the McChord law. The lower court is affirmed, but the Supreme Court, holding that the statute did not authorize the wholesale creation of tariffs, avoids dealing with the constitutional questions involved. The decision was announced by Justice Peckham. The roads who began the suit asserted that the law was void in that it deprived the companies of property without due process of law, imposed excessive penalties and vested the commission with judicial powers without providing an appeal from its findings. The Supreme Court in the present decision holds that an inquiry into the question of constitutionality is unnecessary, but the action of the commission in making general rates is held to be beyond the powers conferred by the McChord law.

Justice Peckham said that the commission had assumed the power under the McChord law of making what were termed maximum rates for the transportation of all commodities on all railways to and from all points within the state. This was an enormous power. Jurisdiction so extensive and comprehensive as must exist in a commission in the making of

## REVENUES AND EXPENSES OF RAILWAYS.

MONTH OF FEBRUARY, 1900.

Operating expenses.

Name of road.	Mileage operated at end of month.	Operating revenues—Total.		Maintenance of way and structures.		Trans- portation.		Outside operations, net.		Operating income, comp. with last year.	
		Freight.	Passenger.	Equipment.	Traffic.	General.	Total.	(or deficit).	Taxes.	Taxes.	Operating income, comp. with last year.
Atchison, Topeka & Santa Fe.....	7,459	\$4,006,079	\$1,469,415	\$5,923,093	\$817,111	\$125,014	\$3,549,505	\$2,373,588	\$214,216	\$214,216	\$199,895
Atlantic Coast Line.....	4,409	1,652,602	573,663	2,391,265	283,015	316,094	41,200	704,170	66,779	1,411,318	889,947
Boston & Maine.....	2,242	1,756,251	832,255	2,810,433	237,524	374,808	26,880	1,406,743	2,129,198	520,034	316,652
Central of Georgia.....	1,916	1,666,251	1,842,298	929,761	118,760	173,739	26,002	2,088,607	34,889	641,968	523,411
Central of New Jersey.....	668	1,495,160	238,586	1,521,731	130,002	290,433	21,153	1,66,038	37,692	952,318	23,282
Chesapeake & Ohio.....	1,896	3,157,189	1,077,381	4,691,857	403,830	643,830	88,444	2,065,109	44,918	1,293,436	190,237
Chicago & North Western.....	7,635	3,865,759	1,255,079	4,719,427	461,163	1,03,458	121,384	1,097,054	120,727	1,293,436	196,629
Chicago, Burlington & Quincy.....	9,023	587,241	265,545	923,157	93,458	103,476	20,370	432,088	23,397	1,02,784	421,680
Chicago, St. Paul, Minn. & Omaha.....	1,739	845	1,096,628	1,525,667	182,915	105,405	16,701	200,895	27,768	460,554	115,567
Colorado & Southern.....	1,252	532,323	82,441	647,209	74,250	144,461	12,921	200,785	56,015	21,285	166,422
Delaware, Lackawanna & Western.....	893	1,642,226	533,431	1,219,043	129,394	443,197	52,610	710,828	50,709	1,386,398	767,995
Erie, Colorado & Santa Fe.....	2,902	2,847,424	210,028	958,535	161,695	122,636	21,810	85,913	1,189,024	2,196,149	104,393
Kansas City Southern.....	518	2,821,992	822,596	3,024,497	396,533	789,022	101,582	1,562,953	28,218	681,615	230,000
Kansas City, St. Louis & San Francisco.....	827	513,947	90,978	674,971	67,872	70,739	12,461	20,568	40,720	1,02,776	172,388
Lehigh Valley.....	1,446	1,837,773	225,826	1,433,045	262,757	402,141	62,674	200,706	56,015	2,05,252	242,428
Louisville & Nashville.....	4,588	2,532,129	161,888	3,185,846	391,523	663,980	105,915	1,180,183	82,337	200,706	225,777
Maine Central.....	1,931	402,154	145,187	588,447	62,561	96,678	65,779	242,536	82,337	1,112,318	97,124
Michigan Central.....	1,746	1,331,626	199,988	1,801,207	122,433	212,433	33,173	1,03,171	1,426,514	1,31,962	131,283
Missouri, Kansas & Texas.....	3,072	1,222,865	500,040	1,859,992	336,173	250,071	46,483	754,833	76,054	1,037,271	111,125
Mobile & Ohio.....	1,098	591,661	94,682	677,792	79,412	131,326	13,877	28,481	337,256	2,67,920	119,953
New York, New Haven & Hartford.....	2,000	1,854,814	1,577,732	3,826,500	313,654	486,104	20,861	1,680,261	94,542	1,02,776	54,272
Norfolk & Western.....	1,925	1,848,838	228,071	2,167,477	222,844	396,647	39,834	665,755	52,862	1,293,962	516,457
Pennsylvania, Co. & St. Louis.....	1,614	3,053,511	974,258	4,309,819	609,039	672,733	1,539,537	85,891	672,733	1,161,093	93,080
Pennsylvania, Co. & St. Louis.....	4,416	1,971,898	428,554	2,671,607	345,181	539,793	62,490	1,125,033	65,528	1,426,514	35,946
Pennsylvania, R.R. Co.....	4,048	7,288,656	2,029,129	11,018,627	3,450,034	3,793,627	2,785,447	1,363,232	522,885	1,112,318	342,122
Pennsylvania, R.R. Co.....	2,341	741,061	192,712	1,010,563	122,127	164,161	25,564	487,196	34,794	1,72,721	126,844
Pere Marquette, Balt. & W. Michigan.....	716	563,199	512,932	1,230,794	193,148	269,993	23,248	537,984	31,958	1,02,776	143,336
Pittsburgh, Cinc., Chic. & St. Louis.....	1,472	1,701,664	450,591	443,410	513,324	459,809	66,593	941,028	52,137	1,02,776	4,261
St. Louis & San Francisco.....	4,727	1,895,727	678,317	2,802,504	262,890	303,522	66,367	1,012,300	92,133	1,737,515	1,064,992
Southern.....	7,055	2,770,700	919,068	4,062,233	461,183	597,387	15,139	482,655	33,299	1,294,789	4,815
Texas & Pacific.....	1,885	10,426,711	2,790,733	1,090,438	144,710	214,447	1,04,625	81,700	899,250	1,208,188	1,163,251
Vandalia.....	3,310	1,971,471	636,814	2,918,644	233,728	414,035	81,700	839,747	100,677	1,248,687	4,199
Yazoo & Mississippi Valley.....	1,371	589,236	157,326	1,179,933	22,377	22,377	17,933	16,405	494,373	147,462	132,063
Yazoo & Mississippi Valley.....	1,371	589,236	157,326	1,179,933	148,351	148,351	23,965	23,965	678,553	116,021	116,021
EIGHT MONTHS OF FISCAL YEAR.											
Atchison, Topeka & Santa Fe.....	7,459	29,745,083	12,251,672	49,914,130	6,356,629	7,942,114	1,038,074	13,570,906	1,039,391	29,967,114	19,947,016
Atlantic Coast Line.....	4,409	11,815,196	3,839,637	16,882,189	2,316,471	2,416,300	284,537	5,551,361	485,566	11,074,235	1,405,125
Boston & Maine.....	2,422	15,014,372	9,184,040	20,202,187	3,029,950	2,954,776	2,127,716	11,719,160	611,333	1,426,514	431,503
Central of Georgia.....	1,916	15,241,687	1,908,277	7,823,123	1,058,403	1,427,580	210,302	2,401,402	290,650	5,388,337	2,434,786
Central of New Jersey.....	668	10,711,051	2,854,378	14,341,125	1,407,502	2,442,721	202,322	9,935,676	297,009	8,285,313	6,055,822
Chesapeake & Ohio.....	1,896	13,667,314	3,993,575	17,436,669	1,944,024	3,337,003	291,567	16,650,268	734,302	26,452,668	12,175*
Chicago & North Western.....	7,635	25,220,521	11,657,132	44,681,725	5,285,212	6,035,183	747,703	16,650,268	16,229,057	10,780,184	9,400,000
Chicago, Burlington & Quincy.....	9,023	35,178,739	13,410,130	51,139,716	7,291,627	8,775,254	1,017,707	171,589	3,357,564	34,907,488	93,022,523
Chicago, St. Paul, Minn. & Omaha.....	1,739	5,743,610	2,797,215	9,149,716	1,077,486	953,707	1,042,280	1,04,625	211,808	3,789,500	3,360,408
Cincinnati, St. Louis & Nashville.....	1,252	4,570,282	1,048,982	12,363,771	880,714	1,338,487	149,051	4,397,682	280,532	5,046,386	4,222*
Delaware, Lackawanna & Western.....	893	16,191,245	4,474,045	22,055,223	2,10,166	3,014,578	383,059	6,184,539	318,671	12,222,639	189,980
Gulf, Colorado & Santa Fe.....	1,518	6,582,422	2,018,930	9,030,118	1,334,493	1,420,049	630,138	5,181,704	630,138	9,828,166	2,600,366
Illinois Central.....	4,518	10,446,466	7,427,971	16,767,579	2,367,757	2,651,200	380,423	6,392,184	546,156	12,327,922	2,395,222
Kansas City Southern.....	827	4,354,836	881,535	5,759,555	623,013	672,193	42,052,245	767,472	2,337,477	1,408,371	220,531
Lehigh Valley.....	1,446	1,251,302	2,620,257	21,705,052	2,328,046	2,050,323	2,077,357	3,259,267	55,972	3,500,170	2,239,388
Louisville & Nashville.....	4,388	21,961,355	6,865,266	30,723,241	5,386,444	666,965	6,681,676	4,21,933	5,015,584	14,006,527	5,301*
Maine Central.....	938	3,217,568	1,939,056	5,516,019	840,443	770,403	5,302,549	6,81,164	6,337,582	14,006,527	2,738
Michigan Central.....	1,416	20,324,289	4,514,311	27,236,326	2,60,130	4,381,940	493,212	9,370,726	1,04,737	19,617,759	1,04,737
Missouri, Kansas & Texas.....	1,746	10,191,200	4,710,074	17,657,059	2,367,757	2,651,200	380,423	6,392,184	546,156	12,327,922	2,395,222
New York, New Haven & Hartford.....	1,098	4,791,203	828,645	6,553,024	4,267,094	4,203,948	222,327	2,337,477	767,472	1,408,371	220,531
Norfolk & Western.....	1,900	17,047,148	15,226,024	21,629,623	6,72,193	7,133,049	1,835,063	215,972	3,500,170	2,239,388	58,797
Southern.....	1,925	16,162,405	5,255,920	19,178,752	2,077,357	3,259,267	313,761	5,555,577	421,933	11,507,805	1,317*
Pennsylvania R.R. Co.....	1,416	32,084,534	11,383,241	46,10,384	4,839,505	5,302,549	355,158	1,340,112	726,225	9,123,775	3,308,328
Pennsylvania R.R. Co.....	1,416	20,324,289	4,514,311	27,236,326	2,60,130	4,381,940	493,212	9,370,726	1,04,737	19,617,759	1,04,737
Pere Marquette.....	4,048	6,572,345	19,251,643	91,177,798	2,367,757	2,651,200	380,423	6,392,184	546,156	12,327,922	2,395,222
Philadelphia, Balt. &											

rates by one general tariff upon all classes of commodities upon all the railways throughout the state was not to be implied.

The proper establishment of reasonable rates upon all commodities carried by railways and relating to each and all of them within the state depended upon so many facts which might be different in regard to each road that it was plain that the work ought not to be attempted without a profound and painstaking investigation, which could not be intelligently or with discrimination accomplished by wholesale. It might be a matter of surprise to find such power granted to any commission, although it would seem that it had in some cases been attempted. At any rate the jurisdiction of such an extraordinary commission should be conferred in plain language, free from any doubt. Such power was not to be taken by implication and the language should admit of no other construction.

Justice Peckham decides that the law gives the commission no power to fix rates in general but only after investigation to amend one found extortionate.

#### Missouri Rate Case.

On April 3 Frank Hagerman, counsel for all the leading railways in Missouri in the case involving the constitutionality of the passenger and freight rate laws of that state, filed a motion with Judge Smith McPherson in the Federal court at Kansas City asking the court to make certain changes in the decision rendered on March 8 in this case. He asked that the portion of the opinion in which the penalty clauses in the laws in question were held constitutional be stricken out, saying that the fines that could be imposed under the statute would amount to more than 30 times the value of the railway properties in the state. He also asked the court to strike out the portion of the decision recommending a 2½-cent fare on the stronger roads, saying that it was contrary to the finding in the decision that the roads were entitled to earn 6 per cent. Judge McPherson, in his original decision, directed that the cost of the suit be divided between the state and the railways. Mr. Hagerman asked that this also be stricken out, saying that if the roads were required to pay the costs of litigation that they won it would be a direct incentive to the state to protract the litigation against the carriers.

The Railroad Commission of Missouri has ordered a hearing at Kansas City on April 22 on the question of a reduction of rates on all classes and commodities. It is stated that the Commissioners intend to reduce the freight rates to a point just above the maximum fixed by law, which the Federal court held unconstitutional, and that they are acting on the advice of Attorney-General E. W. Major.

The legislature of Missouri is also once more taking a hand in the contest. The House Committee on Railroads has reported favorably a bill to empower the Railroad Commission, or any public service commission which may hereafter be created to take its place, to fix maximum passenger rates. For the purpose of the act the roads would be divided into three classes. Class A would include roads whose gross passenger earnings per mile from intrastate travel exceed \$1,500 per annum; Class B those earning more than \$750 and less than \$1,500, and Class C those reporting less than \$750.

Governor Hadley has written a letter to C. R. Gray, Vice-President of the St. Louis & San Francisco, urging the railways in the state to make a 2½-cent rate with 10 per cent. off for round trips instead of a 3-cent rate.

#### Traffic and Transportation Association of Louisville.

The Traffic and Transportation Association of Louisville has been organized at Louisville, Ky., with a membership of nearly 200. The following officers have been elected: President, J. B. Ford; Vice-Presidents, F. M. Hartwell, M. L. Akers and W. H. Newman; Directors, J. M. Ryan, R. L. McKellar, C. L. Adler, A. Brandeis, Charles P. Fink, L. J. Irwin and J. P. Hanly; Secretary, W. E. Chambers; Treasurer, W. T. Vandenberg. The purpose of the organization is to foster a closer relationship between shippers and railways. Permanent club rooms are to be secured. J. S. Bumbaugh, Traffic Manager of the American Steel & Wire Company, has given \$500 as the nucleus of a fund for furnishing the club rooms.

## Railroad Officers.

### ELECTIONS AND APPOINTMENTS.

#### Executive, Financial and Legal Officers.

A. H. Bright, General Counsel of the Minneapolis, St. Paul & Sault Ste. Marie, has been elected also the Vice-President of the Wisconsin Central, succeeding A. C. Starr.

William G. Wheeler, United States District Attorney for Wisconsin, has been appointed the Counsel of the Chicago & North Western in Wisconsin, succeeding Edward M. Hyzer, promoted.

Frank A. Lehman, Superintendent of Transportation of the Atchison, Topeka & Santa Fe, has been appointed the Assistant to the Second Vice-President, succeeding C. W.



F. A. Lehman.

Kouns, who has been appointed General Manager of the Western Lines, as announced in the *Railroad Age Gazette* of March 19. Mr. Lehman was born on May 31, 1871, at Mast Hope, Pa. He began railway work on August 18, 1888, as a telegraph operator on the Atchison, Topeka & Santa Fe. After that he was consecutively, to February 1, 1902, clerk in the office of the General Roadmaster, clerk in the office of the Trainmaster, clerk in the office of the Superintendent, a despatcher and clerk in the office of the Third Vice-President. On February 1, 1902, he was made chief clerk in the office of the Vice-President, and on November 1, 1907, was appointed Superintendent of Transportation.

Walter L. Ross, General Traffic Manager of the Toledo, St. Louis & Western and the Chicago & Alton, has been elected Vice-President in charge of traffic. He was born in 1869 at Bloomington, Ill., and educated in the public schools. He began railway work in 1887 as office boy on the Wabash. He later became operator and then was made chief clerk in the local office of the Wabash. Later he was transferred as clerk to the Trainmaster's office and was then promoted to local agent. He became General Agent for the Indiana, Illinois & Iowa, now part of the Chicago, Indiana & Southern. Before 1904 he had served as Freight and Passenger Agent, and on June 1 was made General Passenger Agent of the Toledo, St. Louis &



W. L. Ross.

Western. On April 1, 1905, he was appointed also General Freight Agent, and in December, 1907, was made General Traffic Manager of the Toledo, St. Louis & Western and the Chicago & Alton, which position he held until his recent election.

Edmund Pennington, President of the Minneapolis, St. Paul & Sault Ste. Marie, has been elected also President of the Wisconsin Central, succeeding Newman Erb. Mr. Erb will retain his position as chairman of the board of directors.

E. R. Hudson, Vice-President of the Mexican Central, has been elected Vice-President of the National Railways of Mexico. J. M. Frazer, Treasurer of the National Railroad of Mexico, has been elected Treasurer of the National Railways of Mexico.

Edward S. Wortham, Purchasing Agent of the Toledo, St. Louis & Western and the Chicago & Alton, has been appointed also Assistant to the Senior Vice-President, George H. Ross. After receiving an education in the public schools of Lynchburg, Va., Mr. Wortham began railway work in January, 1889, as a messenger in the Yardmaster's office of the Shenandoah Valley, now a part of the Norfolk & Western, at Roanoke, Va. He later worked in the mechanical department of the Norfolk & Western, serving in various capacities. In 1892 he entered the transportation department, serving in various clerical positions. In 1894 he went to the Erie, where he held various clerical positions in the office of the General Freight Agent, at Buffalo, N. Y. On November 7, 1900, he was appointed secretary to the President of the Toledo, St. Louis & Western, at Toledo, Ohio, and on March 4, 1901, was made chief clerk to the President. On June 4, 1904, he was appointed Purchasing Agent, and on December 1, 1907, was made Purchasing Agent also of the Chicago & Alton.

#### Operating Officers.

R. D. Parker has been appointed the General Superintendent of the Atchison, Topeka & Santa Fe Western Lines, with office at La Junta, Colo.

S. W. Tracy has been appointed the Superintendent of Car Service of the Indiana Harbor Belt, with office at Gibson, Ind., succeeding R. W. Willis, deceased.

William N. Neff has been appointed the Superintendent of the St. Louis Southwestern of Texas, with office at Mount Pleasant, Tex., succeeding C. J. Larimer, resigned.

Payson Ripley, Trainmaster of the Atchison, Topeka & Santa Fe, has been appointed the Trainmaster of the Middle division, with office at Newton, Kan., succeeding W. C. Ashcraft, transferred.

C. W. Kouns, General Manager of the Western Lines of the Atchison, Topeka & Santa Fe, has been appointed the General Manager also of the Eastern Railway of New Mexico, with office at Amarillo, Tex.

Robert King has been appointed the Superintendent of district two, Atlantic division, of the Canadian Pacific, with office at Woodstock, N. B., succeeding D. W. Newcomb, assigned to other duties.

The position of Terminal and Lighterage Agent held by Riley Williams, of the Delaware, Lackawanna & Western, has been abolished and the duties of that position are assumed by E. T. Rine, Superintendent.

Leslie C. Reddish has been appointed the Car Accountant of the Toledo Terminal Railroad, with office at the terminal station, Toledo, Ohio. He will have charge of car records and per diem and reclaim accounts.

C. H. Gaunt, Assistant General Manager and Superintendent of Telegraph of the Atchison, Topeka & Santa Fe, has been appointed the Assistant General Manager of both the Eastern Lines and Western Lines, with office at Topeka, Kan., and will perform such duties as may be assigned to him.

William Walliser, Assistant Superintendent of the Chicago & North Western, has been appointed the Superintendent of the Minnesota division, with office at Winona, Minn., succeeding E. G. Schevenell, resigned. H. M. Eicholtz, Trainmaster, succeeds Mr. Walliser as Assistant Superintendent of the Galena division, with office at Chicago. M. J. Hanson succeeds Mr. Eicholtz, with office at Clinton, Iowa.

Owing to the impaired health of T. S. McDowell, J. W. Walton will assume the duties of General Superintendent of the Missouri, Kansas & Texas of Texas, with the title of

Acting General Superintendent, and Mr. McDowell will assume the duties of Superintendent of Transportation of the Missouri, Kansas & Texas and the Missouri, Kansas & Texas of Texas, with the title of Acting Superintendent of Transportation.

F. C. Fox, General Superintendent of the Eastern Grand division of the Atchison, Topeka & Santa Fe, has been appointed the General Superintendent of the newly created Eastern district of the Eastern Lines, with office at Topeka, Kan. H. W. Sharp, General Superintendent of the Western Grand division, has been appointed the General Superintendent of the Western district of the Eastern Lines, with office at Newton, Kan. The Eastern district comprises the lines in Illinois, Missouri, Kansas City and the eastern divisions. The Western district comprises the Middle, Southern Kansas and Oklahoma divisions.

Gilbert P. DeWolf, whose appointment as Superintendent of the National Railways of Mexico has been announced in these columns, was born in 1861 in Chattahoochee county, Ga. He took a college course at Auburn, Ala., and later studied some time at the United States Military Academy at West Point. He began railway work in 1887 as rodman on the Central of Georgia, being promoted later to Assistant Engineer. In 1902 he was appointed Supervisor on the National Railroad of Mexico and became successively roadmaster, yardmaster, Resident Engineer, Assistant Chief Engineer of Construction, Terminal Superintendent, Engineer of Maintenance of Way of the National Lines of Mexico, and was then made Superintendent.

Charles B. Strohm, Superintendent of Terminals of the Atchison, Topeka & Santa Fe at Chicago, has been appointed the Superintendent of Transportation, succeeding F. A. Lehman, promoted. He was born on December 30, 1861, at Iowa City, Iowa.

After receiving an education in the University of Iowa, he began railway work in 1878 as an operator on the Atchison, Topeka & Santa Fe. In April, 1880, he opened the first railway telegraph office at Albuquerque, N. Mex. During the same year he was made material clerk at San Marcial, N. Mex., and in 1881 material clerk at Benson, Ariz. In 1882 he became a clerk in the Topeka, Kan., offices, and in 1885 was appointed material agent. In 1888 he was made chief clerk to the Superintendent at Wellington, Kan., and on March 18, 1889, he was appointed a Trainmaster. On June 10, 1894, he was appointed Assistant Superintendent of the Chicago division, with office at Chicago. On February 1, 1896, he was made a Trainmaster, with office at Chillicothe, Ill., and on August 1, of the same year, Superintendent of Terminals, with office at Chicago.

C. B. Strohm.

intendant at Wellington, Kan., and on March 18, 1889, he was appointed a Trainmaster. On June 10, 1894, he was appointed Assistant Superintendent of the Chicago division, with office at Chicago. On February 1, 1896, he was made a Trainmaster, with office at Chillicothe, Ill., and on August 1, of the same year, Superintendent of Terminals, with office at Chicago.

#### Traffic Officers.

A. D. Perkins has been appointed an Agent of the Toledo Terminal Railroad, with office at the terminal station, Toledo, Ohio.

Walter S. Curlett has been appointed a Freight Solicitor of the Pennsylvania, with office at New York, succeeding Walter J. Pollock, resigned.

George B. French, General Agent of the Chicago, Milwaukee & St. Paul, has been appointed also the Foreign Freight Agent, with office at Chicago.

J. E. Johanson has been appointed an Assistant General

Freight Agent of the Chicago, Rock Island & Pacific, with office at Little Rock, Ark.

Norton England has been appointed a Commercial Freight Agent of the Missouri Pacific and the St. Louis, Iron Mountain & Southern, with office at Atlanta, Ga.

Thomas W. Parker, Chief Clerk in the Freight Department of the St. Louis & San Francisco, has been appointed the Assistant Freight Traffic Manager, with office at St. Louis, Mo.

R. M. Ritchey, a General Agent of the Union Pacific, has been appointed a General Agent of the St. Joseph & Grand Island, with office at Kansas City, Mo. J. J. Hartnett succeeds Mr. Ritchey, with office at Leavenworth, Kan.

J. N. Tittemore, General Traffic Manager of the Pere Marquette, having resigned, full charge of the Traffic Department will hereafter be in the hands of A. Patriarche, Assistant to the President, with office at Detroit, Mich.

E. P. Erkenbrack, Traveling Agent of the Wisconsin Central, has been appointed a Contracting Freight Agent of the Great Northern, with office at Tacoma, Wash. H. B. Crewson succeeds Mr. Erkenbrack, with office at Seattle, Wash. Effective April 10.

Ralph S. Stubbs has been appointed the General Freight and Passenger Agent of the Phoenix & Eastern, the Arizona & Colorado, the Maricopa & Phoenix and the Gila Valley, Globe & Northern, with office at Tucson, Ariz., succeeding M. O. Bicknell, resigned.

F. W. Brown, Agent of the Chicago, Peoria & St. Louis, has been appointed the General Agent, Freight Department, with office at St. Louis, Mo., succeeding John W. Fox, Commercial Agent, deceased. E. F. Randall succeeds Mr. Brown, with office at East St. Louis, Ill.

Thomas B. Moss, Traveling Freight Agent of the International & Great Northern, has been appointed a Commercial Agent, with office at Kansas City, Mo., succeeding E. M. Gannon, resigned to go into other business. W. G. Trufant succeeds Mr. Moss, with office at St. Louis, Mo.

C. W. Andrews, Contracting Agent of the St. Louis, Iron Mountain & Southern, has been appointed a Traveling Freight Agent, with office at Houston, Tex., succeeding T. A. Helm, promoted. W. Q. Hodgson, Live Stock Agent of the Missouri, Kansas & Texas, succeeds Mr. Andrews, with office at Dallas, Tex.

William P. Fitzsimons has been appointed the Commissioner of Industry of the Grand Trunk, with office at Montreal, and will have, in connection with freight and passenger traffic, express and transportation departments, special supervision of the work of locating new industries, etc., and general development of resources of the territory served by the Grand Trunk.

The Freight Tariff Bureau of the Wheeling & Lake Erie has been transferred from St. Louis, Mo., to the General Freight Department at Cleveland, Ohio, and the office of Chief of Tariff Bureau has been discontinued. All matters relating to coal, coke and ore traffic will be handled by H. J. Booth, General Coal and Ore Agent. Traffic other than coal, coke and ore, and matters pertaining to tariffs, divisions and percentages, will be under the jurisdiction of E. B. Coolidge, General Freight Agent.

R. J. McKay, Assistant General Passenger Agent of the Toledo, St. Louis & Western and the Chicago & Alton, has been appointed the First Assistant General Passenger Agent, with office at Chicago. C. R. Murray, Division Passenger Agent, has been appointed an Assistant General Passenger Agent, with office at St. Louis, Mo., instead of W. H. Abel, as previously reported, succeeding David Bowes, resigned. Frank W. Elder, Traveling Passenger Agent, succeeds Mr. Murray, with office at Springfield, Ill. Frank O'Brien, Traveling Passenger Agent, succeeds Mr. Elder, with office at Cincinnati, Ohio. W. D. Powell succeeds Mr. O'Brien, with office at St. Louis, Mo.

#### Engineering and Rolling Stock Officers.

James Carmack has been appointed a Supervisor of Signals of the Northern Pacific, with office at Seattle, Wash.

C. B. Keiser has been appointed the Master Mechanic of the Pennsylvania Tunnel & Terminal, with office at New York.

C. I. Leiper has been appointed a Supervisor of Track of the Pennsylvania Tunnel & Terminal, with office at New York.

James MacMartin, Chief Engineer of the Delaware & Hudson, has resigned to go into business for himself. A successor has not as yet been appointed.

George C. Koons, Supervisor of the Pennsylvania, has been appointed the Engineer of the Cumberland Valley, with office at Chambersburg, Pa., succeeding T. J. Brereton, resigned.

W. F. Ackerman has been appointed the Shop Superintendent of the Havelock shops of the Chicago, Burlington & Quincy, with office at Lincoln, Neb., succeeding F. Kroehler, assigned to other duties.

H. E. Billman, Roadmaster of the St. Louis, Iron Mountain & Southern, has been appointed the Assistant Division Engineer of the Southern Kansas division, with office at Coffeyville, Kan. Wade Ray succeeds Mr. Billman, with office at Wichita, Kan.

Augustus Mordecai, recently engaged in making a valuation of the physical property of the New York, New Haven & Hartford, and previous to that Engineer of Maintenance of Way of the Erie, has opened an office at 1328 Citizens building, Cleveland, Ohio, as Consulting and Constructing Engineer.

James M. Reid, whose appointment as Chief Engineer of the National Railways of Mexico has been announced in these columns, was born October 12, near Americus, Ga., in 1861.

Before and after entering college he served under his father, O. L. Reid, and uncle, Capt. W. L. Reid, well-known railway men of Georgia, Alabama and Texas, as apprentice in the Maintenance of Way and the Bridge and Building departments of the Western Railway of Alabama. In 1878 he entered the preparatory department of the Alabama Polytechnic Institute, taking a special course in architecture with the regular course in civil engineering. In the class of 1880 he was awarded the prize in drawing. During the summer of 1881 he worked as assistant

engineer on location of the extension of the East Alabama & Cincinnati, now part of the Central of Georgia. In 1881 he accompanied his former professor in engineering, Col. R. A. Hardaway, an educator and railway builder, to Mexico, and served as assistant engineer on location and resident engineer on construction in the Tamasopo Cañon-Mexican Central Railway (Tampico division). In 1882 the faculty of the Alabama Polytechnic Institute granted the degree of B. E., considering the year's experience on heavy work in Mexico and with an approved examination equal to the senior year in college. In 1884 he was made engineer in charge of Weatherford and Mineral Wells railway work in Texas, and in 1886 Division Engineer in charge of location and construction on the Royal Trans-African Railway. In 1888 he was appointed Chief of Surveys and Superintendent of Construction. He received the honorary degree of C. E. from the Alabama Polytechnic Institute in 1890. In 1895 he was made a Division Engineer of the Mexican Central. From 1897 to 1900 he worked as levelman, transitman and engineer in charge of the Neuapan extension of the National of Mexico, and in 1900 became Roadmaster and a year later Reconnaissance Engineer of the El Salto extension, which is the only 1 per cent. compensated grade line for over 270 miles south-



James M. Reid.

bound into the City of Mexico. In 1902 he became Chief Engineer of Construction of the National of Mexico, and in 1906 Chief Engineer. A year later he was appointed Chief Engineer of Construction, National Lines of Mexico, which position he held until his present appointment.

R. G. Kenly, whose resignation as Engineer of Maintenance of Way of the Lehigh Valley has been announced in these columns, has been appointed the Chief Engineer of the Minneapolis & St. Louis and the Iowa Central.

Mr. Kenly was born in 1866 at Ritchie Mines, W. Va. After an education in the public schools of Maryland and at Baltimore City College, he began railway work in September, 1885, as rodman on the location of the Annapolis & Baltimore Short Line, now part of the Maryland Electric. Later in the same year he was appointed levelman of the Baltimore & Eastern Shore, now part of the Baltimore, Chesapeake & Atlantic. On October 1, 1886, he was appointed Assistant Supervisor of the Northern Central.

On March 15, 1891, he was appointed Supervisor of the Radford division of the Norfolk & Western. Two years later he was made Assistant Engineer of the same division, and in 1887 he became Assistant Trainmaster of this division and of the Pulaski division. The next year he was made assistant to the Chief Engineer of the West Virginia Central & Pittsburgh, now part of the Western Maryland. Later in that same year he was appointed draftsman and Engineer in charge of construction of the Philadelphia & Erie, now part of the Pennsylvania, and of the Northern Central. In 1899 he was made Supervisor of the Lehigh division of the Lehigh Valley, and later in that year Division Engineer of the Lehigh and New Jersey divisions of that road. In 1904 he was made Trainmaster of the same divisions, and was later made Superintendent and Chief Engineer of the Lehigh & New England. In June, 1908, he became Engineer of Maintenance of Way of the Lehigh Valley, which position he has since held.

#### Purchasing Officers.

W. K. Kilgore has been appointed the Fuel Agent of the Chicago, Milwaukee & St. Paul, with office at Chicago, succeeding H. R. Lloyd, resigned.

#### OBITUARY.

O. F. O'Connor, for the past 17 years Assistant Ticket Auditor of the Chicago, Milwaukee & St. Paul, died on March 31 at Chicago.

L. J. Storey, Chairman of the Texas Railroad Commission, who died recently at Austin, Tex., was 75 years old and had been a member of the Railroad Commission since November, 1894.

Charles H. Deans died at his home in Phoenixville, Pa., on March 7, 1909, after a week's illness of pneumonia. He was born in 1863, and graduated from Lehigh University in 1889 with the degree of C.E. By 1895 he had become Vice-President and Chief Executive Officer of Sooysmith & Co., foundation engineers and contractors. He later became President of the Engineering Contract Co. He was one of the first to successfully use pneumatic caissons in the foundation of the office buildings of New York. At the time of his death he was in charge of the construction of piers of the Baltimore & Ohio bridge over the Susquehanna river at Havre de Grace, Md.



R. G. Kenly.

## Railroad Construction.

#### New Incorporations, Surveys, Etc.

ARKANSAS CO-OPERATIVE CONSTRUCTION CO.—See Northwest Arkansas Electric Interurban Railway.

ARKANSAS ROADS.—L. S. Powers, of Fayetteville, Ark., and residents of Harrison are planning to build a line from Bergman, Ark., southwest via Harrison and Jasper towards Fort Smith.

BENNETTSVILLE & CHERAW.—Work, it is said, will be started about May 1 on an extension from Drake, S. C., southeast to Brownsville, seven miles.

CANADIAN RIVER RAILWAY.—See Santa Fe, Liberal & Englewood.

CANE RIVER BELT.—Surveys and rights-of-way are said to have been secured by the Valley Trading Co. of Natchitoches, La., for a line from Alexandria, La., northwest via Colfax to Natchitoches, about 60 miles. The line will not be built unless the Sibley, Lake Bistineau & Southern line of the Shreveport, Alexandria & Southwestern is extended south about 45 miles to a connection with its proposed northern terminus at Natchitoches.

CAROLINA, CLINCHFIELD & OHIO.—Work has been completed from Dante, Va., to Bostic, N. C.

CHAMBERSBURG, GREENCASTLE & WAYNESBORO (ELECTRIC).—An officer writes that it is the intention to eventually extend this line from Chambersburg, Pa., northeast to Shippensburg. The Penn Mar branch is also to be extended to Monterey. These improvements will probably not be carried out in 1909, as the company has had some difficulty in securing the necessary rights-of-way. (April 2, p. 774.)

CHARLOTTE HARBOR & NORTHERN.—Work is said to have been started on the extension projected from Arcadia, Fla., north to Plant City, 60 miles. (March 19, p. 652.)

CHICAGO & ALTON.—Oliver Brothers & Callaway, contractors, Knoxville, Tenn., have received a contract for grading and bridge work, excepting the steel, for 46 miles of second track and grade reduction on the Chicago-St. Louis line. The work is between Bloomington, Ill., and Atlanta, 19 miles, and between Springfield and Nilewood, 27 miles. Its completion will give the Alton a double-track line to Chicago from the south side of the coal fields which it traverses, with the exception of about four miles between Atlanta and Lawndale.

CHICAGO, MILWAUKEE & PUGET SOUND.—Track laying has been completed between Missoula, Mont., and Garrison. Press reports indicate that ballasting will be completed about June 1st, and that freight and passenger service will be established soon afterward. (March 19, p. 653.)

DARDANELLE, OLA & SOUTHERN.—Plans are said to be complete to build an extension from Dardanelle, Ark., west to Paris, about 40 miles.

DAYTON, LEBANON & CINCINNATI R. R. & TERMINAL CO.—This company is building three miles of line south from Dayton to a connection with the main line. J. C. Carland & Co., contractors, Toledo, Ohio.

DYERSBURG NORTHERN.—Plans are said to be complete to build an extension from Tiptonville, Tenn., northeast to Hickman, Ky., about 40 miles. (March 19, p. 653.)

HUDSON & MANHATTAN.—A sub-committee of the New York Public Service Commission, First district, has reported favorably on the application to extend the subway from its proposed terminus at Thirty-third street and Sixth avenue, Borough of Manhattan, New York City, to the Grand Central Station at Forty-second street. (Feb. 19, p. 380.)

KINGFISHER, COLORADO & GULF.—Press reports from Oklahoma City, Okla., indicate that contracts have been let to Frank Adams, Stanley Brown and Frank Brown for building the first section from Oklahoma City northwest to Kingfisher. (April 2, p. 774.)

MISSISSIPPI WESTERN.—A permanent survey is being made

for this line, projected from Meriden, Miss., southwest to Natchez, 165 miles. Much of the right-of-way has already been secured. (Oct. 2, p. 1075.)

**MOBILE & OHIO.**—Press reports from Montgomery, Ala., indicate that a line is to be built from Narkeeta, Miss., northeast to Gainsville, Ala.

**NORFOLK & WESTERN.**—According to press reports, a large force of men are now at work double-tracking the line near Columbus, Ohio, cutting down grades, eliminating curves and making improvements all along the line.

**NORTHWEST ARKANSAS ELECTRIC INTERURBAN RAILWAY.**—The Arkansas Co-Operative Construction Co., Bentonville, Ark., has been incorporated to build a standard gage electric interurban from Joplin, Mo., to northwest Arkansas, about 200 miles. Surveys have been in progress for some time and construction is planned at an early date. The officers are: President, Winlock Morris; Vice-President, H. A. Luekens; Secretary, J. W. Blocher; Treasurer, Dwight Dickson; Chief Engineer, P. H. Sackett.

**PENNSYLVANIA.**—The work of double-tracking between Salisbury, Md., and Fruitland, four miles, is now under way. (March 19, p. 657.)

**SALT LAKE & OGDEN.**—An officer writes that the electrification from Salt Lake City, Utah, north to Ogden, 35½ miles, will probably be finished by June. Work on the transmission lines and overhead construction was started about a month ago and bonding will be commenced soon. All the work is to be under way by April 15. (March 19, p. 657.)

**SANFORD & GLENDON.**—Incorporated in North Carolina with a capital stock of \$70,000 to build from Sanford, Lee county, N. C., east to Glendon, 14 miles. Incorporators include: J. B. Linnig, W. C. Carrell and J. H. Glover, of Philadelphia, Pa., and J. H. Hull, of Hemp and J. H. Kennedy, of Gulf.

**SANTA FE, LIBERAL & ENGLEWOOD.**—The tentative plans of reorganization which are being considered by the new joint committee in regard to protective measures in respect to the New Mexico and Oklahoma enterprises projected by E. D. Shepard & Co., New York, involve the formation of a new holding company to take over the various properties according to their valuation. The report of T. J. Odell and E. V. Harman, who have made an investigation into the status of the several enterprises, is in part as follows:

There are no immediate prospects of building this line. The conditions are such that a financial plan could not be presented which would show any return on the investment for some time. While the line is necessary for the development of the territory served, it cannot be made to pay on coal traffic alone. (March 19, p. 658.)

There is no necessity for completing the Santa Fe, Raton & Des Moines, into Des Moines, Iowa, for two reasons: first, there is not sufficient coal traffic going into Texas by this route to warrant such construction, and second, should the present tonnage increase to 1,000,000 tons annually, and that tonnage be equally divided between the Colorado & Southern, St. Louis, Rocky Mountain & Pacific and the Santa Fe, Raton & Des Moines, it would then be cheaper to make a trackage or traffic agreement with the Rocky Mountain road than to parallel it for a distance of 30 miles. (March 19, p. 658.)

The Santa Fe, Raton & Eastern should be temporarily abandoned and the property placed in the hands of a caretaker as there is no local traffic on the line and the mail contract can be carried out with a horse and wagon. The road should remain out of commission until the properties of the Yankee Fuel Co. are sufficiently developed to warrant shipments.

The Canadian River Railroad is projected from Woodward, Okla., to Oklahoma City and Guthrie, 220 miles, of which five miles are graded at Woodward. (March 19, p. 652.)

**SANTA FE, RATON & DES MOINES.**—See Santa Fe, Liberal & Englewood.

**SANTA FE, RATON & EASTERN.**—See Santa Fe, Liberal & Englewood.

**SHREVEPORT, ALEXANDRIA & SOUTHWESTERN.**—See Cane River Belt.

**TENNESSEE NORTHERN.**—An officer writes that the proposed route is from Ravenscroft, Tenn., on the N. C. & St. L. branch, to Winchester Siding, on the Queen & Crescent. The work will include one bridge 400 ft. long and 90 ft. high. (March 19, p. 658.)

**VEBLEN & NORTHWESTERN.**—Incorporated to build from Veblen, S. Dak., northeast to Hankinson, N. Dak., about 30 miles. The charter was recently amended to change the proposed route from Veblen east via White Rock to a connection with the Chicago, Milwaukee & St. Paul at a point near White Rock.

**VIRGINIAN RAILWAY.**—On April 2 the road was formally opened for traffic from Norfolk, Va., west, thence north to Deepwater, W. Va., 436 miles.

**WEST VIRGINIA ROADS (ELECTRIC).**—Albert M. Schenck, of Wheeling, W. Va., associated with Pittsburg, Pa., capitalists, is planning to operate a high-speed electric line from Wheeling northeast to Pittsburgh, Pa. The plans call for a new line from Wheeling to a connection with the Wabash at West Middletown, Pa., about 15 miles, from which place the tracks of the Wabash are to be used into Pittsburgh, 30 miles.

## Railroad Financial News.

**DENVER CITY TRAMWAY.**—Clark, Dodge & Co., New York, the International Trust Co., Denver, Colo., and E. W. Clark & Co., Philadelphia, Pa., have sold at 95 the present issue of \$1,848,000 first and refunding mortgage 5 per cent. bonds of 1908-1933. The company owns and operates the street railways of Denver, Colo., about 185 miles of track. The bonds are part of an authorized issue of \$25,000,000.

**ERIE.**—The Public Service Commission, Second district, has given an extension of 30 days in which the Erie may accept the provisions of the commission's order regulating the issue of \$30,000,000 bonds.

**FONDA, JOHNSTOWN & GLOVERSVILLE.**—Holders of the \$2,500,000 outstanding common stock are given the right to subscribe at par for \$500,000 6 per cent. cumulative preferred stock to the extent of 20 per cent. of their holdings. A syndicate has agreed to take at par all the stock not otherwise subscribed for. The Fonda, Johnstown & Gloversville runs from Fonda, N. Y., to Northville, 26 miles.

**HOUSTON BELT & TERMINAL.**—A first mortgage securing \$2,246,000 5 per cent. 30-year bonds has been approved by the Texas Railroad Commission. The money derived from the sale of the bonds is to be used to reimburse the Atchison, Topeka & Santa Fe, the Trinity & Brazos Valley, the St. Louis, Brownsville & Mexico, and the Beaumont, Sour Lake & Western for money advanced by them for construction work on the property of the Houston Belt & Terminal.

**INTERBOROUGH METROPOLITAN.**—Edwin Hawley has been elected a director, succeeding W. G. Oakman, resigned. During the past year or more the following directors have retired: Paul D. Cravath, J. S. Auerbach, John D. Crimmins, J. B. McDonald, De Lancey Nicholl and George W. Wickersham, and the following new directors have been elected: H. M. Fisher, W. L. Pepperman, W. G. Roelker, R. R. Govin and August Belmont, Jr.

**METROPOLITAN STREET RAILWAY (NEW YORK).**—Over 90 per cent. of the 4 per cent. 100-year refunding bonds has been deposited under the agreement of November 25, 1907, with the bondholders' protective committee, Edwin S. Marston, chairman, and the time for making deposits has been limited to May 1.

**MILLBROOK COMPANY.**—See New York, New Haven & Hartford.  
**NEW YORK & PORTCHESTER.**—See New York, New Haven & Hartford.

**NEW YORK, NEW HAVEN & HARTFORD.**—The Public Service Commission, Second district, has granted permission to the New Haven company to buy all the stock of the New York & Portchester and the New York, Westchester & Boston, thus making it possible to do away with the Millbrook Company. (March 12, page 526.)

NEW YORK, WESTCHESTER & BOSTON.—See New York, New Haven & Hartford.

**RUTLAND.**—With a total mileage operated of 468 miles in both years, the company had gross earnings of \$2,744,240 in 1903 as compared with \$3,058,087 in 1907, nearly the entire decrease in earnings being in the falling off in earnings from freight. There was revenue from this source amounting to \$1,525,097, a decrease of over 17 per cent. from the earnings in 1907. Expenses as a whole also decreased; they amounted to \$1,963,516 in 1908, being \$210,462 less than in the previous year, and taking 71.55 per cent. of gross earnings as compared with 71.08 taken for expenses in 1907. A large part of the saving in expenses came from heavily cutting maintenance charges. Maintenance of equipment for instance cost \$356,610 last year, being \$72,241, or 17 per cent. less than in 1907. Maintenance of way and structures cost \$393,358 last year. This is \$93,397 less than was charged for this account in the previous year. The expenses of conducting transportation while equaling 38.18 per cent. of the gross revenue in 1907, equaled 40.85 per cent. in 1908.

Repairs and renewals of locomotives averaged \$1,715 per locomotive owned in 1908 as compared with \$2,119 in 1907, and repairs and renewals of passenger-train cars averaged \$660 per car in 1908 as compared with \$662 in 1907; while repairs of freight cars averaged \$45 per car in 1908 as compared with \$52 in 1907.

Under conducting transportation expenses, while there was a decrease in cost of fuel for locomotives and other such expenses due to less business in 1908, the amount charged for loss and damage was \$24,116, an increase of \$9,303 over the amount charged in 1907.

The balance sheet shows cash on hand of \$249,466, and cash loans of \$50,000. Current liabilities amount to \$589,348, and there are in addition notes payable amounting to \$363,819. There is no information in the annual report as to when these notes are due.

The preferred stock of the Rutland is a 7 per cent. cumulative stock of which \$9,057,600 has been issued, and in the past minority stockholders have complained that money was put back into the property that might more properly have been paid in dividends to the preferred holders. In 1907 and 1906, 1½ per cent. was paid on this preferred stock, and in 1908 nothing was paid. There has never been more than 4 per cent. paid on the stock and therefore there is a large accumulated dividend due. After crediting the sinking fund for redemption of equipment bonds with \$100,000 in both 1908 and 1907, and after the payment in 1907 of \$135,864 in dividends, the company had a surplus of \$71,499 in 1908 and \$7,308 in 1907.

The total number of tons of revenue freight carried amounted to 1,759,502 tons in 1908 and to 135,828 tons in 1907. Earnings per ton per mile were 0.794 cents in 1908 and 0.781 cents in the previous year. There were 1,567,231 passengers carried last year as compared with 1,621,104 in the previous year; and earnings per passenger per mile amounted to 2.241 cents in 1908 and 2.225 cents in 1907.

**SANTA FE, RATON & DES MOINES.**—See notice about this company under Santa Fe, Liberal & Englewood in the Railroad Construction column.

**SOUTHERN RAILWAY.**—The \$16,000,000 5-year 5 per cent. collateral trust bonds due April 1 were paid at the Guaranty Trust Co., New York.

**VIRGINIAN RAILWAY.**—See this company under Railroad Construction.

**WESTERN MARYLAND.**—The interest due April 1 on the \$42,518,000 first mortgage bonds was paid by the receiver through the sale of \$700,000 4½ per cent. receiver's certificates, and the United States Circuit Court at Baltimore has authorized the receiver to sell in addition \$1,250,000 5 per cent. receiver's certificates to mature April 1, 1911. The proceeds are to be used to pay a promissory note for \$1,101,875 held by the Washington Trust Co., New York, and to deposit \$41,734 under the sinking fund agreement of the first mortgage of the Georgia's Creek & Cumberland. This issue is a direct obligation of the receiver and a first lien on the entire capital stock of the Georgia's Creek & Cumberland, owned by the Western Maryland.

## Equipment and Supplies.

### LOCOMOTIVE BUILDING.

*The Canadian Pacific* has ordered two Pacific locomotives from the American Locomotive Co.

*A. V. Kaiser & Co.*, Philadelphia, Pa., are in the market for from 4 to 6 saddle tank engines. These engines should have 8-in. or 9-in. cylinders and weigh from 10 to 12 tons. Bidders are requested to give full details by first mail, with prices based on the engines knocked down in export shipping shape, f.o.b. alongside steamer in New York for shipment to Cuba.

*The Detroit River Tunnel Co.*, a subsidiary company of the Michigan Central, has ordered six electric locomotives from the General Electric Co. One of the locomotives has been built and tested. The remaining five are now under construction and will be delivered early next fall, a few months before the completion of the tunnel. Each locomotive will weigh 100 tons, and it is planned to use two of them for the handling of heavy freight trains through the tunnel. The number that will be required to take care of the freight and passenger business crossing the Detroit river is at this time problematical, and until the tunnel is in full operation it will not be known whether additional locomotives of similar design will be ordered.

### CAR BUILDING.

*The Cuba Railroad* is in the market for 100 box and 100 flat cars. The specifications are Cuba Railroad standard.

*The Washington Water Power Co.*, Spokane, Wash., has authorized the purchase of 15 additional cars. These are to be delivered before next fall.

*The Marshall & East Texas* has ordered one passenger coach and one combination mail, baggage and passenger car from the American Car & Foundry Co.

*The La Belle Iron Works*, Steubenville, Ohio, reported in the *Railroad Age Gazette* of March 5 as asking prices on 50 seventy-five-ton gondola cars, has decided to defer the purchase of this equipment for the present.

*A. V. Kaiser & Co.*, Philadelphia, Pa., are in the market for about 50, one or two-yard capacity, 30-in. gage, one or two-way dump cars. Bidders are requested to give full details by first mail, with prices based on cars knocked down in export shipping shape, f.o.b. alongside steamer in New York for shipment to Cuba.

*The Chicago, Milwaukee & St. Paul* has ordered 67 passenger cars. As reported in the *Railroad Age Gazette* of April 2, 15 baggage, 10 sleeping, 10 coaches and 5 dining cars will be built by the Pullman Co. The remaining cars, including 15 coaches, 10 mail and express and 2 buffet cars, will be built by the Barney & Smith Car Co.

*The Canadian Pacific*, as reported in the *Railroad Age Gazette* of March 5, has ordered 500 fifty-ton steel coal cars from the Dominion Car & Foundry Co. These cars will be 36 ft. 9½ in. long, 9 ft. 6 in. wide and 5 ft. high, inside measurements, and 38 ft. 10 in. long over end sills. The special equipment will include:

Brakes .....	Westinghouse
Bolsters, truck .....	Simplex
Brake-beams .....	Simplex
Brake-shoes .....	Am. Brake Shoe & Fdry. Co., steel back
Couplers .....	Simplex
Draft gear .....	Miner
Dust guards .....	Harrison
Journal boxes .....	McCord, mailable iron
Side bearings .....	Susemihl, roller
Trucks .....	Arch-bar type with Barber roller device
Wheels .....	Canadian Pacific standard

### IRON AND STEEL.

*The Milwaukee Light & Power Co.* has ordered 4,500 tons of girder rails from the Pennsylvania Steel Co.

*The Lake Shore & Michigan Southern* has ordered 3,500 tons of open-hearth rails from the Indiana Steel Co.

*The Chicago Railways Co.* has ordered 22,000 tons of girder rails from the Lorain Steel Co. and will probably place an additional order of 5,000 tons soon.

*The Twin City Rapid Transit Co.* has ordered 1,100 tons of open-hearth rails from the Indiana Steel Co. These rails are for the Duluth-Superior Traction Co.

*The Trans-Continental Railway Commission*, P. E. Ryan, Secretary, Ottawa, Ont., will receive bids until April 13 for 5,154 gross tons of 80-lb. rails, either open hearth or Bessemer, and the necessary fastenings, for delivery at West Fort William, Ont., by June 15.

*General Conditions in Steel.*—In summing up the steel situation the *Wall Street Journal* brings out the following facts: First, the United States Steel Corporation is operating at about 60 per cent. of its capacity and has been for the last two months; second, according to present estimates, the Steel Corporation will show about \$15,000,000 earnings for the current quarter, or about \$60,000,000 a year; third, the independent steel companies are suffering, as present prices for steel seem to indicate that many of them will be forced to either reduce or pass their dividends; fourth, the Steel Corporation continues to under-cut its competitors in its aggressive policy for business; fifth, the merchant blast furnaces, which supply iron to the independent mills, are suffering and will be compelled to make a curtailment in production; sixth, the Steel Corporation has not as yet reduced wages, but may yet do so; seventh, no pronounced improvement in steel earnings can be expected for some time to come, perhaps not until the latter part of this year; eighth, improvement in steel is confined to structural steel, tin plates and sheets, and ninth, wire products and steel rails are the only classes of steel not affected by the price changes.

#### RAILROAD STRUCTURES.

**FORT WORTH, TEXAS.**—Press reports indicate that the fire on April 3 destroyed the roundhouse, repair shops, coal chutes and a number of box cars belonging to the Texas & Pacific, and that about 20 locomotives were greatly damaged. Officers of the road are reported to have placed the damage at about \$160,000.

**NEW YORK.**—Announcement was made on April 5 by the New York Bridge Department that the lower floor members of the river span of the Manhattan bridge across East river would be completed by April 9.

**RICE LAKE, WIS.**—The Chicago, St. Paul, Minneapolis & Omaha is said to be planning to put up a brick passenger station at Rice Lake to cost \$25,000.

**ST. BONIFACE, MAN.**—The National Transcontinental Railroad Commission has accepted the bid submitted by Haney, Robertson & Quinlan, of Montreal and Toronto, for building the new terminal shops. The amount of their bid was \$869,000. (Dec. 18, p. 1612.)

**TACOMA, WASH.**—The Northern Pacific will let a contract soon for building a temporary passenger station and office building to be used while its permanent station and terminals are being completed. They will be erected at Dock and Twentieth streets. The passenger station will be one story high with dimensions of 182 ft. x 35 ft. The office building will adjoin the passenger station and be two stories high.

#### SIGNALING.

**The Duluth & Iron Range** has given a contract to the Federal Signal Co. for a mechanical interlocking plant at Knife River, Minn.

**The Missouri, Kansas & Texas** is in the market for three-position automatic block signals to be installed between Machens, Mo., and New Franklin, Mo., 162 miles.

## Supply Trade News.

T. N. May, heretofore with the Brady Brass Co., New York, is now dealing in railway equipment and supplies, with office at 2 Rector street, New York.

Frank Miller, formerly the Engineer of Julian L. Yale & Co., Chicago, has been appointed the Sales Manager of the W. L. Miller Heating Co., Chicago.

*The H. W. Johns-Manville Co.*, New York, has given the contract for 1,100 tons of structural steel for its new warehouse at Milwaukee, Wis., to the American Bridge Co.

*The Automatic Car Coupler Co.*, Los Angeles, Cal., has been incorporated with \$50,000 capital stock. The incorporators are F. R. Bonney, F. H. Norwood, W. H. Soale, K. Elliott and C. H. Wills.

*The New York, Philadelphia & Norfolk* has ordered a steel car float with a capacity of 30 cars, and also a sea-going steel hull tug boat. The present floating equipment of the N. Y., P. & N. consists of 11 car floats and 7 tugboats.

*The Union Draft Gear Co.*, Chicago, has been incorporated to manufacture and deal in railway specialties, equipment and appliances; capital stock, \$2,000,000. The incorporators are Matthew J. O'Brien, Daniel L. Madden and Francis O'Shaughnessy.

A. Munch, for the past eight years Sales Manager of the Northern Metallic Packing Co., St. Paul, Minn., has resigned. It is understood that Mr. Munch will take a vacation, after which he will become identified with a prominent supply concern.

*The New York offices of the Baldwin Locomotive Works, Philadelphia, Pa., and the Standard Steel Works Co., Philadelphia, have been moved to 50 Church street. The New York representatives of both companies are Harry W. Sheldon and Frederick W. Weston.*

Gustav Baurmann, President of the Phoenix Car Spring Co., Chicago, died at his home in Chicago on March 31 as a result of a stroke of apoplexy which he suffered nearly a year ago. He was born in 1857, at Louisville, Ky., and located in Chicago about thirty years ago.

A. R. Young, C.E., Western Agent of the Fort Pitt Bridge Works, Pittsburgh, Pa., has resigned to become a member of the firm of W. R. Carter & Co., engineers and contractors, Lawrence, Kan. H. C. Breider, C.E., of the Pittsburgh office of the Fort Pitt company, succeeds Mr. Young, with office at Chicago.

*The Rowe Perfection Sleeping Car Co.*, Seattle, Wash., has been incorporated with \$20,000,000 capital to manufacture and sell a new type of sleeping car. It is intended to build a plant employing several thousand men. President, John Anthen; Vice-President, Eugene E. Harold; Secretary and Manager, John L. Loughran, all of Seattle.

James MacMartin, Chief Engineer of the Delaware & Hudson, has resigned, effective about May 1, to become Vice-President and General Manager of the Elmore & Hamilton Contracting Co., Albany, N. Y. The Contracting company has work under way on the Long Island Railroad, the Western Maryland and the New York city water supply system.

An organization in a city of Latin America engaged in the import and export trade would like to receive propositions and prices from contractors for furnishing the following materials: Locomotives, fuel, bridge material, rails, turn-tables, water tanks, telegraph and telephone supplies, trucks, concrete and cement block machines, wire and building materials of all kinds. (Inquiry No. 3250, Bureau of Manufactures, Washington, D. C.)

*The General Railway Equipment Co.*, Chicago, has just been organized to do a general business in buying, selling and handling new and rebuilt railway and contractors' equipment, locomotives, cars, steam shovels, etc. I. J. Kusel, formerly President of the American Car & Equipment Co., Chicago, is President, and Thomas C. McCalla is Secretary

and Treasurer. The offices of the company are at 1535 Old Colony building.

The Commonwealth Steel Co., St. Louis, Mo., has given the contract for the erection of a finishing building, 75 ft. x 125 ft., and a core and sand storage room, 62 ft. x 112 ft., at its Granite City, Ill., works, to the Missouri Bridge & Iron Co., St. Louis, Mo. The new equipment to be installed will include a 7½-ton traveling crane, which will be built by the Commonwealth company; one 4-ft. and one 10-ft. heavy duty planer, the latter to be furnished by Manning, Maxwell & Moore, Inc., New York.

A report from an American consul in eastern Europe says that it is understood that contracts have been let for the construction of nine sections of roadbed for a railway in that region. The consul reports that this should be a good opportunity for the sale of construction materials. Two large bridges will be built. Plans and specifications will be ready shortly and the construction will be under the supervision of an engineer whose address is given in the report. (Inquiry No. 3255, Bureau of Manufactures, Washington, D. C.)

W. P. Pressinger, who recently resigned as General Manager of the compressor department of the Chicago Pneumatic Tool Co., Chicago, has organized the W. P. Pressinger Co. to handle the vacuum cleaning machines, both portable and stationary, made by the Keller Manufacturing Co., Philadelphia, Pa., and formerly sold by the Chicago Pneumatic Tool Co. The new company has opened offices and sales rooms at 1 West Thirty-fourth street, New York, and will establish local agencies at all distributing points throughout the eastern territory.

The partnership association, existing for the past 20 years under the name George M. Newhall Engineering Co., Ltd., Philadelphia, Pa., has expired and a corporation, the George M. Newhall Engineering Co., has been formed to succeed to the business. The engineering department will be under the personal management of George M. Newhall, President, as heretofore, and the department of supplies for railways, manufacturers and contractors will be under the direction of David Newhall, Vice-President. Robert S. Newhall is Secretary and Treasurer. M. L. Newhall is Manager of the Chicago office.

The Albany Car Wheel Co., Albany, N. Y., has taken over the Thatcher property and will at once begin the manufacture of chilled iron wheels for steam and electric cars. The President of the company is J. A. Kilpatrick, who has been in the wheel business for 30 years and is General Manager of the Canada Iron Corporation, Montreal, Que. J. A. MacIntyre, who has been associated with Mr. Kilpatrick for some years, is Superintendent of the new company. J. A. Granger, for many years with the New York Car Wheel Works, Buffalo, N. Y., and the Griffin Wheel Co., Chicago, is in charge of sales of the new company.

Jasper R. Rand, Vice-President and a Director of the Ingersoll-Rand Company, New York, died of pneumonia in Salt Lake City, Utah, on March 30. Mr. Rand was the son of Jasper Raymond Rand, one of the founders of the Rand Drill Company, and was born in Montclair, N. J., in 1874. He graduated from Cornell University in 1898 with the degree of Mechanical Engineer, and served in Porto Rico in the Spanish-American War as a member of the First New York Volunteer Engineers. During 1899 and 1900 he was President of the Imperial Engine Co., Painted Post, New York, leaving that position to take the Presidency of the Rand Drill Company, which he held until 1905. In that year he was elected Vice-President and a Director of the Ingersoll-Rand Company. Mr. Rand was a member of the American Institute of Mining Engineers and of the American Society of Mechanical Engineers.

Walter S. Seamans, Jr., who on March 1 was made Assistant to the Vice-President, Sales Department, of the American Locomotive Co., New York, is well fitted for the important office he has assumed. He is a graduate of Brown University (1902) with a B. A. degree. In June of that year he entered the employ of the operating department of the New York, New Haven & Hartford and was later transferred to the mechanical department, serving on both the Providence and Worcester divisions. In May of the year following he was made an assistant in the purchasing department of the Providence Works of the American Locomotive Co.; and in April of 1904 was transferred to

the Montreal Works as assistant to the Superintendent. Six months later Mr. Seamans was made Chief Clerk to the General Superintendent at the Schenectady Works of the American Locomotive Co. and was later appointed Assistant to the Manager of the same works. On November 1, 1908, he was appointed Assistant Manager, remaining at Schenectady until last month, when he went to New York to assume the duties of Assistant to Vice-President. Mr. Seamans is 29 years old, having been born in Providence, R. I., in 1880.

John M. Goodwin, of New York, who for nine years was President and General Manager of the Goodwin Car Company, New York and Chicago, having received reports of the Inland

Empire country, became enthused with its master-spirit, growth and progress, and realizing that here was a field for unlimited energy and expansion, has selected Spokane, Wash., for his business center and has established his office in that city. Mr. Goodwin was for years a designer, mechanical expert, draftsman, superintendent, modeier and decorative renderer in connection with some of the most magnificent and costly residences and public buildings in the country. He was engaged in the office of some of the most prominent architects of this

John M. Goodwin.

country, doing modeling work, steel construction and designing on the New York *World* building in the office of George B. Post, architect; also in the office of Richard M. Hunt. Mr. Goodwin worked on the drawings for the George W. Vanderbilt mansion at Biltmore, on the John Jacob Astor estate, on the Ogden Gillette gates at Ochre Court, Newport, and on a number of other such buildings. He also represented Richard M. Hunt at the world's fair at Chicago, being located on the grounds during the erection of the Administration building, which was Mr. Hunt's design. Mr. Goodwin organized and promoted the Goodwin Car Company. The first steps were taken in Chicago. He gradually worked out of his engineering and architectural business as the Goodwin car demanded more and more of his attention, until eventually his entire time was devoted to it. Having secured a competent management for this enterprise, he feels that he can confidently turn his attention to new enterprises in the rapidly growing Inland Empire, resting assured that his stock interests in the car company will be well looked after.

#### TRADE PUBLICATIONS.

*Car Mover.*—The Niagara Device Co., Buffalo, N. Y., in a small leaflet describes, with an illustration, the Niagara car mover.

*Motor Talks.*—The Westinghouse Electric & Manufacturing Co., Pittsburgh, Pa., has issued pamphlet No. 4 on the various uses of the electric motor. The pamphlet also contains a table for finding the current in a three-phase circuit.

*Christopher Columbus.*—The Carborundum Co., Niagara Falls, N. Y., has just issued a small pamphlet which contains a clever satire on Christopher Columbus, written by F. W. Haskell, President of the company. This pamphlet is Vol. I. of the Revised American Statesmen Series.

*Sand Blast.*—The Niagara Device Co., Buffalo, N. Y., has issued two leaflets, one of which contains a general description with illustrations of the Niagara sand blast and the other of the Niagara paint spray. These devices were described in the *Railroad Age Gazette* of October 9, 1908.

*Identification of Smiths.*—The Crocker-Wheeler Co., Ampere,

N. J., is mailing a type-written page containing the identifications of the various electrical engineers at Ampere who are named Smith. It says that statistics show that 1.1 per cent. of electrical engineers are named Smith, and they have been identified at these works by the following: Initials, department, complexion, stature and characteristics.

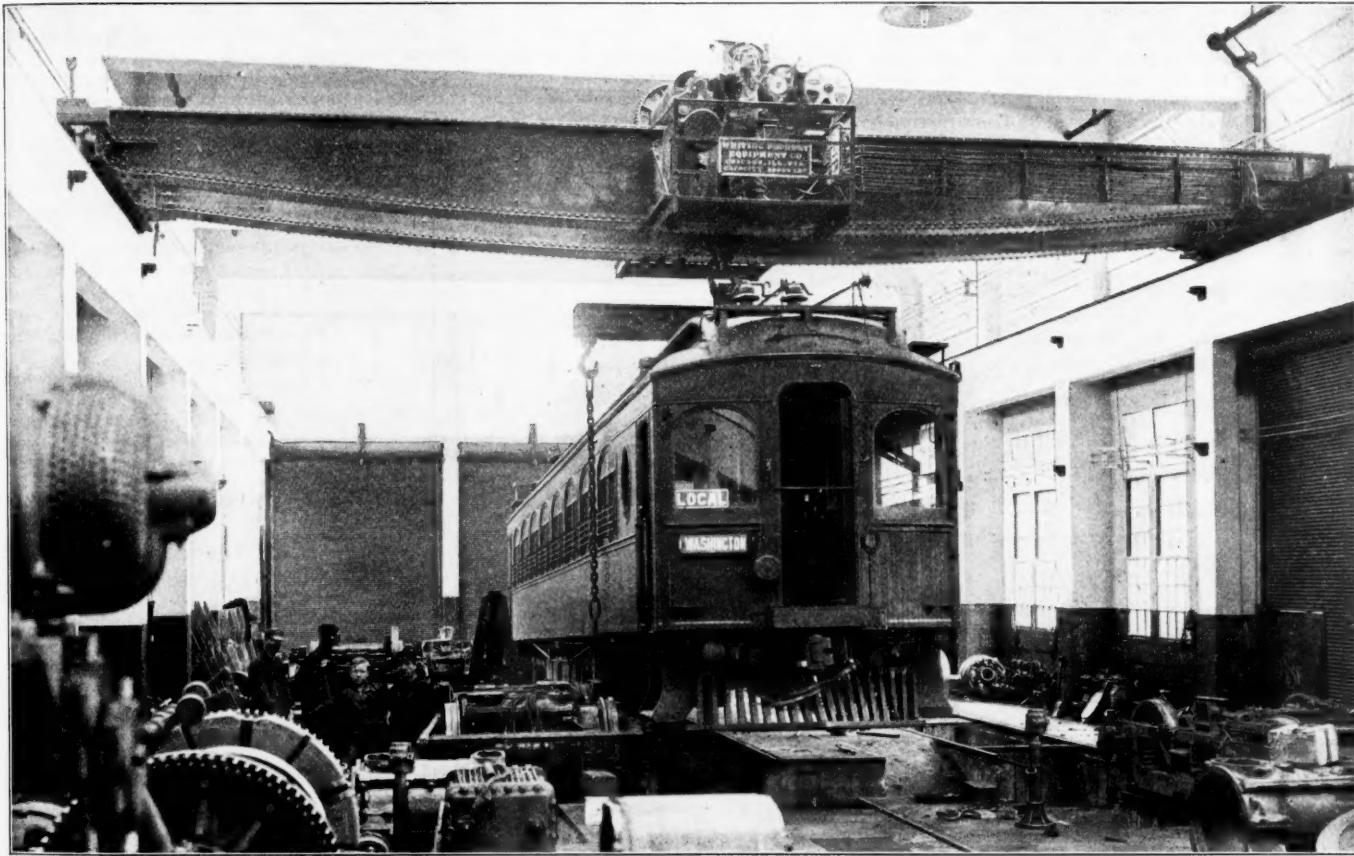
*Safety Valve Capacity.*—The Consolidated Safety Valve Co., New York, has just issued, in pamphlet form, the paper which was read before the American Society of Mechanical Engineers, Feb. 23, 1909, by Philip G. Darling, B.S., mechanical engineer of the company. In addition to the full text of the paper, the pamphlet contains valuable data and tables compiled by the author from extensive tests made on safety valves. This book is published for distribution among mechanical and steam engineers, and will be sent to anyone making application. The paper was published in the *Railroad Age Gazette* of March 5, 1909.

has quickly cooled them while running. Another point is its cold test, which is between 10 and 14 deg. F., according to grade. The grades run from a thin to a very heavy oil, and from a soft to a hard grease, being dark brown in color. Heretofore the combination in one oil of both a high fire test and a low cold test has been difficult, if not almost impossible, to obtain. The company makes all kinds of lubricating oils. One of its specialties is a cylinder oil which it is claimed will not leave a deposit on the cylinders.

The directors of the company are J. G. Wiegand, C. H. Wiegand, D. E. Patterson, H. A. Ellithorpe and Charles Hayward. Its plant is at 9 to 15 North Ada street, Chicago.

#### Traveling Crane for Suburban Car Shop.

When designing the new car repair shops of the Washington, Baltimore & Annapolis Electric Railway, at Academy Junction, Md., shown in the accompanying half-tone, the Roberts & Abbott Co., Cleveland, Ohio, designing engineers, provided in their plant for the installation of an electric traveling crane to be used, first in setting the new shop machinery and later to handle car bodies and heavy running gear parts.



Interior of Washington, Baltimore & Annapolis Electric Railway, Academy Junction, Md.  
Showing Whiting Electric Traveling Crane.

*Calendar of Railway Conventions.*—The Storrs Mica Co., Owego, N. Y., maker of headlight chimneys and lantern globes, has issued a monthly calendar showing the dates of railway club and association meetings and conventions, which should be useful on every railway man's desk. The page for a month is 6½ in. wide and 10 in. high, and a space of ½ in. x 3 in. is allowed for each day. This affords space for all necessary notations on the subject dealt with; and the number of items is by no means small. Under April 9, for example, we find the St. Louis Railway Club, Iowa Railway Club, Central Association of Railroad Officers, American Institute of Electrical Engineers and Western Society of Engineers. There is space also for pencil memoranda.

#### Cosmo Lubricating Oils.

The Cosmo Lubricating Co., Chicago, is making an oil for lubricating purposes that has withstood a fire test of 1,200 deg. F., and is claimed absolutely to prevent hot journals and bearings. The oil also has a viscosity test of between 580 and 625 degrees. In a number of actual tests this oil has been placed on hot shafts, bearings, journals, etc., and

The accompanying illustration shows this crane supporting one end of a car body by a yoke, the car having previously been placed with one truck standing on a small transfer table. On raising the bar body, the truck can readily be run out to one side, and, if desired, either into the blacksmith shop or onto the tracks outside the building.

The principal features of the crane are as follows:

Capacity of main hook.....	15 tons
Capacity of auxiliary hook.....	6 tons
Span .....	42 ft.
Hoisting speed, main hook.....	13 ft. per min.
Hoisting speed, auxiliary hook.....	50 " " "
Bridge travel .....	200 " " "
Trolley travel .....	120 " " "
Motor, main hoist.....	20 h.p.
Motor, auxiliary hoist .....	15 "
Bridge travel .....	15 "
Trolley travel .....	3.5"

The motors are the Westinghouse type K, working at 550 volts, d.c. The controllers are types G-3 and V of the Electric Controller & Manufacturing Company, Cleveland, Ohio.

On the pilasters on both sides of the shops are brackets or pin bearings for the support of small capacity wall cranes. A small number of wall cranes will render very good service over the entire shop, by

using the electric crane to place a wall crane on any pilaster where needed at a moment's notice.

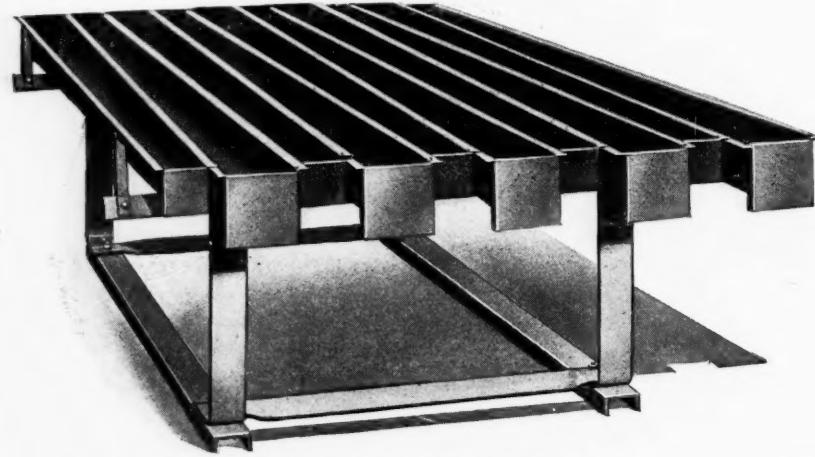
As ordinarily built, the operator's cage is placed below the crane at one side of the girder near the runway. On this crane such an arrangement would interfere with the wall cranes. The cage is placed at the center of the span and at a height sufficient to clear cars when lifted to the maximum height.

The transfer table, the pit of which is to be seen in the illustration, is required to move only the heavy trucks, although it is of strength sufficient to sustain a completely equipped car when rolled across it. The table is operated by hand power, the travel being short.

Both crane and transfer table were designed, manufactured and erected by the Whiting Foundry Equipment Co., Chicago. The building is of reinforced concrete, built with brick curtain walls. The size of the building is 256 ft. 8 in. x 83 ft. 8 in., and the design is such that the lighting is exceptionally good. The heating is by the fan system, with ducts under the floors, and automatic sprinklers provide fire protection.

#### Recent Developments in Car Lighting.

The Safety Car Heating & Lighting Co., New York, is meeting the demands of the situation in its field. As a result of 16 years' experience the company has in the last few years been installing its axle dynamo electric lighting system, and in successful service tests has demonstrated the value of the equipment. The system has been in service on the Kansas City Southern, St. Louis Southwestern, Pennsylvania, Chicago, Rock Island & Pacific, Grand Trunk and New York, Chicago & St. Louis, and within the past few months the company has received an order from the Rock Island for 70 equipments as well as an order for 10 from the Pullman Co. The dynamo, switchboard and regulator, together with their parts, are all illustrated and described in sections



Molds in Position on Shaker.

"J" and "K" of their latest catalogue. This pamphlet also shows a large line of electric fixtures for car lighting.

In the electrical department of its business, the company has aimed to produce the greatest possible results at the least possible costs. The necessity for this has been especially emphasized by the many investigations which have proven that the cost of maintaining electric light in car service is greatly in excess of that of Pintsch gas. It is said to have been a matter of frequent verification that Pintsch gas, in conjunction with the latest single mantle lamp, can be operated at less than one-fifth the cost of electricity; a fact strongly proven from many sources, among which may be mentioned the Canadian Pacific, where it has been in successful operation for several years on 1,292 cars. The Safety Car Heating & Lighting Co. has recently remodeled the entire flat flame equipment of the Delaware, Lackawanna & Western, is now remodeling 8,000 lamps for the Philadelphia & Reading, and the lamps on over 600 cars on the Pennsylvania. The alteration of these flat flame lamps, of which there are over 175,000 in service, burning 3 cu. ft. of gas per hour, and giving an efficiency of 33 candles, means that they can be converted into fixtures giving 100 c. p. with a consumption of approximately 2 cu. ft. of gas per hour, or the equivalent of 1 cent per lamp per hour at the prevailing price of Pintsch gas. The cost of maintaining the new lamp is also economical, since the mantle is practically the only part requiring renewal. This new lamp does away with the ring and cup reflectors, mica chimneys, domes, clusters and cluster stems necessary in the flat flame lamps. The breakage of glassware is also minimized, due to the fact that the lamp is lighted through the opening at the bottom of the globe, which eliminates the necessity of opening the lamp from the bezel ring. The records of the Safety Car Heating & Lighting Co. on the 4,414 cars equipped indicate an average life of three months for the mantle. This record has been especially gratifying in view of the original estimates.

that the mantle proposition would be economical even if they lasted but one month. The simple method of attaching the mantle and the construction of the fixtures generally, is illustrated in section "H" of the company's latest catalogue, which was published under date of December, 1908.

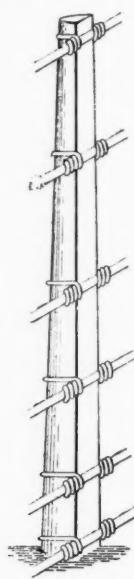
The company makes a particular point of its work in designing the lamp fixtures, in order to keep pace with the tendency in present day-coach building, where artistic interior decoration is important. The newest design in lamp globes is made by fusing together opal and clear glass. The opal glass forms the top part of the globe, and acts as the reflector. The clear glass forms the lower part of the globe and has a ribbed surface, which increases the diffusion of the lamp and at the same time prevents that intense glare which always meets the eye when a high-power burner is used inside a clear glass globe.

#### Reinforced Concrete Fence Posts.

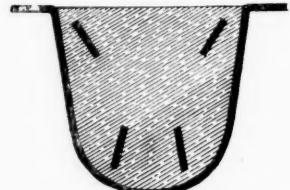
The machines made by the D. & A. Post Mold Co., Three Rivers, Mich., consist of individual molds set on a frame, or "shaker," which is supported on four vertical springs. The molds are U-shaped in cross section and when placed on the frame for filling the flanges overlap, forming a complete table on which the concrete is shoveled or dropped from a mixer. The concrete is leveled off, and by means of a "placing" device, which is furnished with the outfit, the reinforcements are pressed into the wet concrete to their respective positions. The concrete in all ten molds is thoroughly compacted at one time by vibrating the molds lengthwise, the operation being done more quickly

than a single post could be tamped. The filled molds are set off upon level ground, the square ends holding them upright, and when the concrete is sufficiently set they are turned over on their flat sides and the ends removed, when the mold will release the posts, which are left on the ground to season.

The reinforcement recommended is hoop steel. It is a standard product, has great surface for bond, is easily placed in position and has am-



Attachment of Fencing.



Cross Section of Post in Mold.

ple tensile strength. The open face of the mold, however, permits the use of any style or kind of reinforcement.

For fastening the fencing which lies against the flat side of the post, tie wires passed around the post and twisted to the line wires of the fence are recommended. However, the open-face molds permit the use of any of the many methods having metal fasteners, staples, corrugations, or holes through the post. The method recommended will hold the fence securely.

The great advantage claimed for the shaking system of making posts is that ten posts can be made at one time, greatly lessening the labor cost. It avoids the slow tamping process and permits the use of concrete of just the right consistency; that is, all of the particles being thoroughly wet, yet the concrete not being wet enough to pour or to separate.

The cost of making posts with these outfit varies, of course, with the price of labor and materials. Also, the cost of cement and gravel varies, according to the proportion of each used; the cost of labor accordingly as hand or power mixing is used; the reinforcement according to the number of strips per post, or whether other styles or methods of reinforcement are used. With a mixture of 1 part of cement to 4 parts of gravel, 1 cu. yd. of gravel will make 40 posts 7 ft. long; one barrel (4 sacks) of cement will make 24 posts 7 ft. long; with  $\frac{5}{8}$ -in. 18-gage hoop reinforcement, three strips 7 ft. long weigh 2 lbs., and 4 strips,  $2\frac{1}{2}$  lbs. Two men can easily make a batch of 10 posts in 30 minutes. If gravel is 50 cents a yard, cement \$1.20 a barrel, labor 20 cents an hour, and four strips of reinforcement are used, the posts would cost about 17 cents each. If three strips are used, the cost per post is about 15 cents.

These machines have been on the market for about a year, and are in use by block men and farmers in over 30 states. Also, a leading railway is using one of the machines.

## ANNUAL REPORTS

## NEW YORK CENTRAL &amp; HUDSON RIVER RAILROAD CO. FORTIETH ANNUAL REPORT:—FOR THE YEAR ENDED DECEMBER 31, 1908.

The Board of Directors herewith submits its report for the year ended December 31, 1908, with statements showing the results for the year and the financial condition of the company.

The mileage embraced in the operation of the road is as follows:

Main line and branches owned.....	805.47 miles
Proprietary lines.....	3.06 "
*Lines leased.....	2,617.92 "
Lines operated under contract.....	81.70 "
Trackage rights.....	272.64 "
 Total road operated.....	 3,780.79 miles

\* The Dunkirk, Allegheny Valley & Pittsburgh Railroad, 90.51 miles, is also leased by this company, but its mileage and operations are not included in this report. Separate accounts are kept and independent reports prepared in its behalf.

The slight decrease in road mileage operated is due to change of alignment and measurement at various points on the system.

The capital stock authorized and outstanding is as follows:

Authorized to December 31, 1908..... \$250,000,000.00

There was no change during the year in the amount issued and outstanding; the total on December 31, 1908, being

178,632,000.00

Balance authorized but not issued December 31, 1908..... \$71,368,000.00

The funded debt outstanding on December 31, 1907, was

\$230,414,845.00

There have been issued and sold during the year, to provide funds for extensions, additions and improvements to the company's property, Gold debentures of 1904 amounting to

13,000,000.00

making the total funded debt outstanding on December 31, 1908..... \$243,414,845.00

## SUMMARY OF FINANCIAL OPERATIONS AFFECTING INCOME.

	1908.	1907.	Increase or decrease.
EARNINGS FROM OPERATION, miles operated.	3,780.79	3,781.95	1.16 miles.
From freight traffic.....	\$51,200,547.11	\$59,406,446.56	\$8,205,899.45
From passenger traffic.....	27,824,491.56	29,837,859.02	2,013,367.46
From express traffic.....	3,584,721.72	3,577,454.78	7,266.94
From transportation of mail.....	2,737,731.35	2,775,430.31	37,698.96
From rentals.....	3,206,771.06	2,455,295.65	751,475.41
From miscellaneous sources.....	295,104.86	316,573.23	21,468.37
 Totals.....	 \$88,849,367.66	 \$98,369,059.55	 \$9,519,691.89
EXPENSES OF OPERATION.	(73.63%)	(77.06%)	(3.43%)
For maintenance of way and structures.....	\$10,768,284.26	\$12,462,046.72	\$1,693,762.46
For maintenance of equipment.....	13,420,282.68	14,823,630.54	1,403,347.86
For conducting transportation.....	38,759,355.32	45,995,903.11	7,236,547.79
For general expenses.....	2,471,162.52	2,521,753.51	50,590.99
 Totals.....	 \$65,419,084.78	 \$75,803,333.88	 \$10,384,249.10

NET EARNINGS..... \$23,430,282.88

OTHER INCOME.

Dividend on Lake Shore & Michigan Southern stock..... \$5,434,704.00

Dividend on Michigan Central stock..... 1,008,983.00

Dividends and interest on other securities..... 2,024,591.40

Interest on loans, notes and sundry bills..... 1,352,629.11

Sundry miscellaneous profits..... 550,171.77

Totals..... \$10,371,079.28

GROSS INCOME..... \$33,801,362.16

Interest on funded debt..... \$8,501,964.02

Interest on three year 5 per cent. gold notes of 1907..... 952,646.21

Interest on equipment trust certificates..... 586,545.01

Interest on loans, notes and bills payable..... 227,363.92

Use joint facilities: fixed interest basis..... 295,708.39

St. L. & A. Railway: interest, rentals, etc..... 138,600.00

N. Y. & Ottawa Railway: interest on bonds..... 58,240.00

Rentals of leased lines..... 9,708,044.63

Taxes on real estate..... 3,153,338.85

Taxes on special franchises..... 329,796.35

Taxes on capital stock..... 599,751.32

Taxes on bonded debt..... 2,547.18

Taxes on gross earnings..... 150,944.33

	1908.	1907.	Increase or decrease.
Railroad Commissioners' assessments.....	7,200.00	18,447.65	11,247.65
Canadian provincial taxes.....	3,795.40	5,283.65	1,488.25
 Totals.....	 \$24,725,485.61	 \$22,957,948.09	 \$1,767,537.52
 NET INCOME.....	 \$9,075,876.55	 \$11,083,828.94	 \$2,007,952.39
*Cash dividends, four each year.....	8,931,600.00	10,717,920.00	1,786,320.00
 SURPLUS.....	 \$144,276.55	 \$365,908.94	 \$221,632.39

NOTE.—Decreases in *italics*.

\* 5% in 1908; 6% in 1907.

Surplus for the year.....	\$144,276.55
Amount to credit of profit and loss, December 31, 1907.....	14,698,092.24
<i>Add:</i> amount credited from bills against sundry roads, adjusting use of joint properties prior to 1908...	485,408.23
	\$15,327,777.02
 Deduct: 10 per cent. advance payment and instalments prior to current year, on trust equipment.....	\$1,195,930.60
Discount account Gold debentures of 1904.....	1,495,000.00
Discount, commissions and expenses, account equipment trust certificates.....	785,419.66
Injury claims prior to 1908.....	573,396.58
Improvements on Boston & Albany Railroad assumed by lessee.....	229,386.93
Cancellation of uncollectable charges and sundry adjustments.....	101,772.29
	4,380,906.06
 BALANCE, DECEMBER 31, 1908.....	\$10,946,870.96

Gross earnings were \$88,849,367.66, a decrease of \$9,519,691.89.

Freight earnings were \$51,200,547.11, a decrease of \$8,205,899.45. The volume of tonnage carried shows a decrease in nearly all of the classified commodities, the greatest reduction being in grain, bituminous coal, ores and lumber. The loss in tonnage of bituminous coal was in part due to the suspension of labor in the Morris Run district during eight months of the year. The average rate per ton per mile received shows a slight improvement, due largely to the fact that the loss in tonnage of merchandise and other freight of the higher classes was not proportionately as great as in the tonnage of commodities of lower grade.

The passenger earnings were \$27,824,491.56, a decrease of \$2,013,367.46. This decrease was about equally divided between local commutation and interline business. The immigrant business was practically suspended.

The earnings from express traffic were \$3,584,721.72, an increase of \$7,266.94.

The earnings from transportation of mails were \$2,737,731.35, a decrease of \$37,698.96. The earnings during the first six months were affected, as compared with the previous year, by an arbitrary reduction in compensation by Congress, which became effective July 1, 1907.

The expenses of operation were \$65,419,084.78, a decrease of \$10,384,249.10. The percentage of operating expenses to revenue was 73.63% compared with 77.06% in the previous year.

The operating expenses by groups are as follows:

Malten. of way and structures	\$10,768,284.26	decrease	\$1,693,762.46
Maintenance of equipment	13,420,282.68	decrease	1,403,347.86
Conducting transportation	38,759,355.32	decrease	7,236,547.79
General expenses	2,471,162.52	decrease	50,590.99

In maintenance of way and structures reduced charges were quite generally distributed through the various accounts. The expense for renewals of rails was but slightly below that of the previous year, and the charges for renewal of ties increased.

In maintenance of equipment, the various repair items show large decreases, due to the volume of idle cars and locomotives. Under the head of renewals, expenses were charged with \$1,051,601.73, the value of equipment retired, less the amount received from sales, scrap, etc.

In the cost of transportation the station, train and locomotive expenses, notably fuel for locomotives, show large decreases.

The per diem mileage balance decreased \$761,608.52, owing to a reduction early in the year from fifty cents to twenty-five cents in the per diem rate.

The net earnings were \$23,430,282.88, a decrease of \$864,557.21.

Other income amounted to \$10,371,079.28: the decrease of \$1,104,972.08 was largely because of a reduction in the income from investment securities.

The first charges were \$24,725,485.61, an increase of \$1,767,537.52. The principal items of this increase were interest on additional four per cent gold debentures of 1904, interest on equipment trust certificates, and heavier charges for taxes on real estate.

The depression in business which began late in the year 1907 continued throughout the year covered by this report. Through a gradual improvement in revenue during the latter part of 1908, and the continued economy in expenses, especially in the cost of transportation, there resulted a profit from operations for the year sufficient for the declaration of a dividend of five per cent.

The requirements of the Federal and State Commissions entailed considerable additional expenses in the preparation of special statements and the attendance of counsel and employees at the numerous hearings before the Commissions. The first annual reports to the Commissions under the new law have been prepared and filed, and the experience gained in the preparation of these reports, and the subsequent correspondence with the Commissions, prove that in view of the details demanded the added expense is permanent in its nature and will undoubtedly continue to increase.

Extraordinary expenses during the year were as follows:

For additions to property, charged to cost of road and equipment .....	\$5,603,731	54
For construction work on leased lines and for Grand Central terminal improvement, charged in part against funds provided by lessor companies.....	7,644,337	50

Total ..... \$13,248,069 04

As stated in previous report, this company had acquired \$12,000,000 out of a total issue of \$20,000,000 of the capital stock of The Mohawk Valley Company, which was organized as a holding company for the securities in various electric railway, light and power companies in the State of New York.

During the year a plan for the consolidation and merger of certain of the electric railways above mentioned, was submitted to the Public Service Commission of the Second District, and received its approval. This plan provides, among other things, for the reduction of the capital stock of The Mohawk Valley Company from \$20,000,000 to \$7,500,000, and the surrender and retirement of \$12,500,000 of the stock, and the delivery in exchange therefor of stock of the electric railway companies.

Under the provisions of this plan this company retained \$4,500,000 of its total holdings of \$12,000,000 of the capital stock of The Mohawk Valley Company, and surrendered \$7,500,000, for which it received in exchange stock of the electric railway companies of the par value of \$10,239,200.

Out of a total mileage of 389.02 miles of such interurban street railways, a consolidation has been practically effected of the properties in, and in the vicinity of Rochester, New York. The consolidated company—New York State Railways—in exchange for its stock, will acquire all of the other street railway properties formerly owned by The Mohawk Valley Company.

A further consolidation of these companies with the New York State Railways will be accomplished as soon as practicable.

The final deliveries of equipment under the New York Central Lines Equipment Trust Agreement and Lease of 1907 have been made.

Large expenditures have been made in constructing additional tracks, in eliminating grade crossings, and in improving terminal facilities at various points, particularly for passenger traffic. The tidewater terminal at East Boston, where the water front property was destroyed by fire during the year, has been rebuilt, and many other improvements on the line of the Boston and Albany Railroad have resulted in a noticeable gain in the operating efficiency of that road. The cost of the principal improvements on that line is provided for by the issue of Boston and Albany Railroad Company four per cent bonds.

In the enlargement of the Grand Central terminal in New York city, the company's engineers have been confronted with the problem of complete reconstruction and the handling at the same time of heavy passenger traffic.

Notwithstanding these obstacles, the work is progressing steadily without serious inconvenience or delay to the traffic, and the available space for terminal purposes has already been considerably increased. The building for the accommodation of the company's offices and the new post office is nearing completion.

A new contract, effective July 24, 1907, has been executed between the New York, New Haven & Hartford Railroad Company and this company, both for itself and as lessee of the New York and Harlem Railroad. Under the new agreement, interest upon the investment in the property, and the expenses incident to the operation of the terminal, are to be prorated on the basis of relative actual use.

W. H. NEWMAN.

President.

DETAIL OF EQUIPMENT.

	1908†	1907*	Increase or decrease
Locomotives .....	2,361	2,304	57
Cars in passenger service..	2,414	2,424	10
Cars in freight service....	66,832	70,989	4,157
Cars in company's service..	3,505	3,524	19
Vessels in mar. frt. service.	248	246	2
Ferry boats .....	8	8	

†1908 figures include 437 locomotives, 88 cars in passenger service and 3,989 freight cars leased under the "New York Central Lines Equipment Trust of 1907."

\*1907 figures include 244 locomotives, 70 cars in passenger service and 3,997 freight cars leased under the "New York Central Lines Equipment Trust of 1907."

TRAFFIC STATISTICS.

Freight carried and ton mileage.

	1908	1907	Increase or decrease
Tons of freight earning revenue .....	39,105,955	47,422,174	8,316,219
Tons of company's freight	6,240,311	7,837,312	1,597,001
Total number of tons carried .....	45,346,266	55,259,486	9,913,220
Tons of revenue freight carried one mile.....	7,787,086,351	9,362,473,992	1,575,387,641
Tons of company's freight carried one mile.....	1,151,277,700	1,393,953,110	24,675,410
Total number of tons carried one mile....	8,938,364,051	10,756,427,102	1,818,063,051

Passengers carried and ticket mileage.			
Interline passengers.....	2,796,855	3,085,878	289,023
Local passengers.....	28,016,315	30,475,662	2,459,347
Commutation passengers...	12,041,899	12,978,218	936,319

Total number of passengers carried.....	42,855,069	46,539,758	3,684,689
Passengers carried one mile	1,534,649,681	1,687,152,224	152,502,543

FREIGHT RESULTS.

	1908	1907	Increase or decrease
Earnings from transportation .....	\$50,065,454.27	\$58,420,500.56	\$8,355,046.29
Earnings from miscellaneous sources .....	1,135,092.84	985,946.00	149,146.84
Total freight earnings	\$51,200,547.11	\$59,406,446.56	\$8,205,899.45
Earnings per ton.....	\$1.28	\$1.23	\$0.05
Earnings per ton per mile..	cts. 0.643	cts. 0.624	cts. .019
Earnings per train mile..	\$2.47	\$2.61	\$0.14
Earnings per mile of road operated in freight service, trackage included .....	\$13,596.88	\$15,771.19	\$2,174.31
Density of freight traffic (i. e. tons of freight carried one mile per mile of road) .....	2,373,683	2,855,610	481,927
Average number of tons of revenue-earning freight carried per train mile..	384	419	35
Average number of tons of all freight (including company's) carried per train mile .....	441	481	40
Average number of revenue-earning tons per loaded car mile .....	16.58	17.51	.93
Average number of all tons per loaded car mile....	19.03	20.12	1.09
Average number of miles one ton of revenue-earning freight carried.....	199	197	2
Average number of miles one ton carried (all freight) .....	197	195	2
Average number of freight cars per train mile.....	36	36	
Average number of loaded cars per train mile.....	23	24	1
Average number of empty cars per train mile.....	13	12	1
Miles of road, including trackage, operated in freight service .....	3,765.61	3,766.77	1.16

PASSENGER RESULTS.

Earnings from passengers.	\$27,024,664.44	\$29,045,163.51	\$2,020,499.07
Other passenger train earnings .....	387,144.42	359,313.22	27,831.20
Earnings from miscellaneous sources .....	412,682.70	433,382.20	20,699.59
Total passenger earnings	\$27,824,491.56	\$29,837,859.02	\$2,013,367.46
Earnings from mail and express .....	\$6,322,453.07	\$6,352,885.09	\$30,432.02
Earnings per passenger...	\$0.63	\$0.62	\$0.01
Earnings per passenger per mile .....	cts. 1.761	cts. 1.722	cts. 0.039
Earnings per train mile...	\$1.20	\$1.22	\$0.02
Earnings per train mile (including mail and express) .....	\$1.39	\$1.41	\$0.02
Earnings per mile of road operated in passenger service, trackage included (including mail and express) .....	\$9,739.41	\$10,318.93	\$579.52
Density of passenger traffic (i. e. passengers carried one mile per mile of road) .....	437,713	481,051	43,338
Average number of passenger cars per train mile..	5.7	5.8	0.1
Average number of passengers per train mile.....	67	70	3
Average number of miles one passenger carried...	36	36	
Miles of road, including trackage, operated in passenger service .....	3,506.06	3,507.22	1.16

## CONDENSED GENERAL BALANCE SHEET, DECEMBER 31, 1908.

Assets.	Liabilities.
Cost of road and equipment.....	\$221,473,672.05
Advances for leased lines construction and equipment.....	29,413,842.04
Grand Central terminal improvement.....	12,181,854.91
Securities owned.....	153,874,614.39
Other property.....	2,256,363.36
Advances other than construction.....	114,939.82
Fuel and supplies.....	7,115,875.30
Cash and current assets.....	50,722,575.24
Items in suspense.....	3,239,431.12
Securities acquired from lessor companies (per contra).....	3,035,752.00
	\$483,428,920.23
	\$483,428,920.23

## THIRTY-NINTH ANNUAL REPORT LAKE SHORE AND MICHIGAN SOUTHERN RAILWAY COMPANY:—FOR THE YEAR ENDED DECEMBER 31, 1908.

## To the Stockholders of

THE LAKE SHORE & MICHIGAN SOUTHERN RAILWAY COMPANY:  
The Board of Directors herewith submits its report for the year ended December 31st, 1908, with statements showing the results for the year and the financial condition of the company.

The mileage embraced in the operation of the road is as follows:

	Miles
Main line.....	870.89
Proprietary lines.....	220.84
Leased lines.....	416.04
Trackage rights.....	3.33
Total.....	1,511.10

There is a decrease of 9.25 miles in the mileage of road operated during the year, due to changes in location of various terminals and elimination of curves.

There was no change in capital stock during the year,

the amount authorized and outstanding December

31st, 1908, being..... \$ 50,000,000.00

There has been no change in the funded debt of the company, the amount outstanding December 31st,

1908, being..... \$135,400,000.00

There were sold during the year 114,000 shares of stock of the Lehigh Valley Railroad Company, and \$7,000,000.00 of bonds of the Chicago, Indiana & Southern Railroad Company.

There were purchased during the year 4,800 shares of stock of the Toledo Terminal Railroad Company, and one share of stock of the Mahoning State Line Railroad Company.

## SUMMARY OF FINANCIAL OPERATIONS AFFECTING INCOME.

	1908	1907	Increase or decrease
1,511.10 miles operated.....	1,520.35 miles operated.....	9.25 miles operated.....	
From freight.....	\$25,935,473.24	\$31,111,482.12	\$5,176,008.88
From passengers.....	9,583,226.94	9,760,872.95	186,646.01
From express.....	1,460,403.74	1,168,090.82	292,312.92
From mails.....	2,188,215.09	2,224,769.59	36,554.50
From rents.....	729,647.45	604,726.17	124,921.28
From miscellaneous.....	67,891.98	74,533.37	6,641.39
Totals.....	\$39,964,858.44	\$44,953,475.02	\$4,988,616.58

EXPENSES OF OPERATION	(66.84%)	(65.72%)	(1.12%)
Maintenance of way and structures.....	\$4,909,069.09	\$6,328,637.72	\$1,419,568.63
Maintenance of equipment.....	5,422,114.41	6,044,154.56	622,040.15
Conducting transportation.....	15,554,042.88	16,350,910.59	796,867.71
General expenses.....	826,785.19	820,644.40	6,140.79
Totals.....	\$26,712,011.57	\$29,544,347.27	\$2,832,335.70
New construction (addition betterments).....	1,292,276.31	4,082,988.44	2,790,712.13
New equipment (additions).....		911,125.60	911,125.60
TOTAL EXPENSES.....	\$28,004,287.88	\$34,538,461.31	\$6,534,173.43

NET EARNINGS	\$11,960,570.56	\$10,415,013.71	\$1,545,556.85
OTHER INCOME			
Interest and dividends on stocks and bonds owned.....	3,367,797.32	4,530,005.00	1,162,207.68
Interest on loans and deposits.....	1,324,869.16	1,186,414.66	138,454.50
Totals.....	\$4,692,666.48	\$5,716,419.66	\$1,023,753.18
GROSS INCOME.....	\$16,653,237.04	\$16,131,433.37	\$521,803.67

FIRST CHARGES			
Interest on funded debt.....	\$5,170,000.00	\$5,170,000.00	
Interest on gold notes.....	750,000.00	616,118.08	\$133,881.92
Interest on equipment trust certificates.....	289,225.42	289,225.42	
Rentals of leased lines.....	1,100,381.87	1,420,243.93	319,862.06
Interest on loans.....	179,415.86	163,790.82	15,625.04
Dividends on guaranteed stock.....	64,020.00	74,690.00	10,670.00
Taxes.....	1,424,200.77	1,300,874.66	123,326.11
Totals.....	\$8,977,243.92	\$8,745,717.49	\$231,526.43
NET INCOME.....	\$7,675,993.12	\$7,385,715.88	\$290,277.24
Dividends, (12% 1908, 14% 1907).....	3,935,980.00	6,925,310.00	989,330.00
SURPLUS.....	\$1,740,013.12	\$460,405.88	\$1,279,607.24

NOTE: Decrease in *italics*.

To the surplus for the year:—  
there should be added:

Profit from sale of Lehigh Valley Railroad Company stock.....	\$3,472,594.77
Adjustment of sundry accounts.....	35,730.83

\$5,248,338.72

there should be deducted:	
Discount, commissions and expenses on account of New York Central Lines Equipment Trust Certificates of 1907.	\$442,581.79
Discount on sale of bonds of Chicago, Indiana & Southern Railroad Company Settlement with New York Central & Hudson River Railroad Company for facilities at Buffalo prior to 1908.....	650,612.24
	444,535.53
	1,537,729.56

Amount to the credit of profit and loss, December 31, 1907.....	\$3,710,609.16
	17,805,259.03

Balance December 31, 1908..... \$21,515,868.19

The gross earnings for the year were \$39,964,858.44, a decrease of \$4,988,616.58 as compared with last year.

The freight earnings were \$25,935,473.24, a decrease of \$5,176,008.88, due to the falling off in tonnage handled during the depression in business conditions prevailing throughout the year.

Passenger earnings were \$9,583,226.94, a decrease of \$186,646.01. While there was an increase in the number of passengers carried, the reduction of passenger rates in various states caused a decrease in earnings.

The earnings from express traffic were \$1,460,403.74, an increase of \$292,312.92.

The earnings from transportation of mails were \$2,188,215.09, a decrease of \$36,554.50.

The earnings from rentals and miscellaneous sources were \$797,530.43, an increase of \$118,279.89.

The operating expenses for the year amounted to \$26,712,011.57, a decrease of \$2,832,335.70.

Maintenance of way and structures decreased \$1,419,568.63. The heavy improvement work in 1907, consisting of four-tracking the main line, rebuilding bridges, construction of new stations, etc., made necessary, during that year, heavy charges to maintenance to provide for changes to existing roadway and structures. In 1908 there was a curtailment of such permanent improvements, resulting in correspondingly decreased maintenance charges.

Maintenance of equipment decreased \$622,040.15, due to the large amount of equipment out of service during the year, and therefore, not requiring repairs.

Conducting transportation decreased \$796,867.71, due to the falling off in traffic and a resulting reduction in the cost of train service.

General expenses increased \$6,140.79.

The income from investments for the year was \$4,692,666.48, a decrease of \$1,023,753.18, due to reduction in dividends on stocks owned.

The first charges increased \$231,526.43, due to interest on equipment trust certificates and increase in taxes.

There was expended during the year for additions and improvements to the property and charged to income, the following amounts:

Yards and sidings.....	\$134,123.06
Shops and engine houses.....	65,318.63
Stations and other structures.....	380,014.16
Roadway and bridges.....	641,266.03
Land at various places.....	71,554.43

Total..... \$1,292,276.31

W. H. NEWMAN,  
President.

## CAPITALIZATION.

## Capital Stock.

Number of shares issued—Common.....	494,665
Number of shares issued—Guaranteed 10 per cent.....	5,335
Total number of shares outstanding.....	500,000
Number of shares authorized.....	500,000
Total par value issued and outstanding.....	\$50,000,000.00
Total par value authorized.....	\$50,000,000.00
Par value per share.....	\$100.00

Funded Debt.						
Class of bond.	Date of issue.	Date of maturity.	Amount of authorized issue.	Amount issued and now outstanding.	Rate of interest.	Payable on the first days of
Gold mortgage .....	1897	June 1, 1997	\$50,000,000.00	\$50,000,000.00	3 1/2 %	December and June
Gold bonds .....	1903	Sept. 1, 1928	50,000,000.00	50,000,000.00	4 %	March and September
Gold bonds .....	1906	May 1, 1931	50,000,000.00	35,000,000.00	4 %	November and May
Bonds of Other Roads Assumed by This Company.						
Kalamazoo & White Pigeon .....	1890	Jan. 1, 1940	400,000.00	400,000.00	5 %	January and July
FIRST CHARGES. Interest on Bonds.						
Interest 3 1/2 % per annum on Gold mortgage bonds .....			\$1,750,000.00			
Interest 4 % per annum on Gold bonds of 1903 .....			2,000,000.00			
Interest 4 % per annum on Gold bonds of 1906 .....			1,400,000.00			
Interest 5 % per annum on Kalamazoo & White Pigeon mortgage bonds .....			20,000.00	\$5,170,000.00		
Interest 5 % per annum on gold notes of 1907 .....			750,000.00			
Interest on equipment trust certificates .....			289,225.42			
Dividend 12% on 5,335 shares I. S. & M. S. Ry. guaranteed stock .....			64,020.00			
Rental of leased lines .....			1,100,381.87			
Taxes.						
New York .....			\$96,710.16			
Pennsylvania .....			38,639.10			
Ohio .....			614,535.58			
Michigan .....			329,811.60			
Indiana .....			285,896.38			
Illinois .....			58,607.95	1,424,200.77		
Interest on loans and bills payable .....			179,415.86			
Total first charges .....			\$8,977,243.92			
DIVIDENDS.						
Payable July 29, 1908, 6% on 494,665 shares of capital stock .....			\$2,967,990.00			
Payable Jan. 29, 1909, 6% on 494,665 shares of capital stock .....			2,967,990.00			
Total, 12% .....			\$5,935,980.00			
CONDENSED GENERAL BALANCE SHEET, DECEMBER 31, 1908.						
Assets.						
Cost of road and equipment:						
Cost of road .....			\$66,700,000.00			
Cost of equipment .....			24,800,000.00	\$91,500,000.00		
Securities owned:						
Stocks of sundry companies .....			\$88,523,791.65			
Bonds of sundry companies .....			1,194,655.24	89,718,446.89		
Other property:						
Real estate not used in operation of the road .....			431,498.13			
Advances for lessor and other companies:						
Jamestown & Franklin Railroad Co. .....			\$1,024,101.59			
Lake Erie, Alliance & Wheeling Railroad Company .....			1,015,526.31			
Franklin & Clearfield Railroad Co. .....			7,090,815.85			
Cleveland Short Line Railway Co. .....			3,334,932.37			
Lake Erie & Pittsburgh Railway Co. .....			2,437,157.47			
Fuel and supplies .....			14,902,533.59			
Current assets:			3,512,136.69			
Cash charged treasurer .....			\$14,418,964.71			
Remittances in transit .....			1,179,350.74			
Due from agents and conductors .....			376,916.68			
Loans and bills receivable:						
Cleveland, Cincinnati, Chicago & St. Louis Ry. .....			5,500,000.00			
Lake Erie & Western R. R. .....			952,915.88			
Indiana Harbor Belt R. R. .....			793,846.61			
Chicago, Indiana & Southern R. R. .....			505,000.00			
Terminal Railway of Buffalo .....			500,000.00			
Chicago, Kalamazoo & Saginaw Ry. .....			147,832.33			
Other bills receivable .....			823.73			
Traffic balances receivable .....			565,866.66			
Sundry accounts collectible .....			7,455,026.02	32,396,543.36		
Liabilities.						
Capital stock:						
Common .....			\$49,466,500.00			
Guaranteed .....			533,500.00	\$ 50,000,000.00		
Funded debt:						
Gold mortgage bonds .....			\$50,000,000.00			
Gold bonds of 1903 .....			50,000,000.00			
Gold bonds of 1906 .....			35,000,000.00	135,000,000.00		
Bonds of other roads assumed by this company:						
Kalamazoo & White Pigeon first mortgage bonds .....			400,000.00			
Three year five per cent. gold notes of 1907 .....			15,000,000.00			
Current liabilities:						
Audited pay rolls .....			\$ 1,372,586.61			
Audited vouchers .....			1,737,781.40			
Traffic balances payable .....			31,673.49			
Interest and rentals accrued .....			1,499,689.45			
Dividends payable January 29, 1909 .....			2,967,990.00			
Dividends and interest unclaimed .....			68,264.04			
Sundry accounts payable .....			1,162,051.99			
Accounts with lessor companies:						
Mahoning Coal Railroad Company .....			1,705,253.49			
Profit and loss .....			21,515,868.19			
			\$232,461,158.66			
Stocks.						
Number of Shares Total par value						
Battle Creek & Sturgis Railway Co. ....	825	\$ 82,500.00				
Central Trunk Railway Co. ....	238	11,900.00				
Chicago, Indiana & Southern Railroad Co. pf. ....	50,000	5,000,000.00				
Chicago, Indiana & Southern Railroad Co. ....	120,000	12,000,000.00				
Chicago, Kalamazoo & Saginaw Railway Co. preferred .....	1,800	180,000.00				
Chicago, Kalamazoo & Saginaw Railway Co. ....	1,800	180,000.00				
Cleveland, Cincinnati, Chicago & St. Louis Railway Co. ....	302,077	30,207,700.00				
Cleveland Short Line Railway Co. ....	2,500	250,000.00				
Detroit & Chicago Railroad Co. ....	10,000	1,000,000.00				
Detroit, Monroe & Toledo Railroad Co. ....	4,141	414,100.00				
Detroit, Toledo & Milwaukee Railroad Co. ....	7,500	750,000.00				
Detroit Terminal Railroad Co. ....	933	93,300.00				
Elkhart & Western Railroad Co. ....	4,598	229,900.00				
Fairport & Phalanx Railroad Co. ....	10	1,000.00				
Franklin Clearfield Railroad Co. ....	5,550	555,000.00				
Hocking Valley Railway Co. ....	11,540	1,154,000.00				
Indiana Harbor Belt Railroad Co. ....	12,250	1,225,000.00				
Jackson Coal Railroad Co. ....	680	34,000.00				
Jamestown & Franklin Railroad Co. ....	11,733	586,650.00				
Jefferson Coal Co. ....	5,100	510,000.00				
Kalamazoo & White Pigeon Railroad Co. ....	2,309	230,900.00				
Lake Erie, Alliance & Wheeling Railroad Co. ....	50,000	5,000,000.00				
Lake Erie, Alliance & Wheeling Coal Co. ....	50	5,000.00				
Lake Erie & Pittsburgh Railway Co. ....	59,300	5,930,000.00				
Lake Erie & Western Railroad Co. preferred .....	59,400	5,940,000.00				
Lake Shore & Michigan Southern Railway Co. ....	39	3,900.00				
Lansing Transit Railway Co. ....	10	1,000.00				
Mahoning Coal Railroad Co. preferred .....	7,990	399,500.00				
Mahoning Coal Railroad Co. ....	17,318	865,900.00				
Mahoning State Line Railroad Co. ....	12	600.00				
Merchants Despatch Transportation Co. ....	23,335	2,333,500.00				
New York, Chicago & St. Louis Railroad Co. 1st preferred .....	25,030	2,503,000.00				
New York, Chicago & St. Louis Railroad Co. 2nd preferred .....	62,750	6,275,000.00				
New York, Chicago & St. Louis Railroad Co. ....	62,400	6,240,000.00				
Northern Central Michigan Railroad Co. ....	5,985	598,500.00				
Pittsburgh & Lake Erie Railroad Co. ....	100,002	5,000,100.00				
Reading Company 1st preferred .....	121,300	6,065,000.00				
Reading Company 2nd preferred .....	285,300	14,265,000.00				
Reading Company .....	200,050	10,002,500.00				
Sturgis, Goshen & St. Louis Railway Co. ....	3,000	300,000.00				
Swan Creek Railway Co. ....	400	40,000.00				
Taylor Street Warehouse Co. ....	100	10,000.00				
Terminal Railway of Buffalo .....	5,000	500,000.00				
Toledo Terminal Railroad Co. ....	4,800	480,000.00				
Total par value stocks .....		\$127,454,450.00				
Bonds.						
Total amount held						
Elkhart & Western Railroad Co. First mortgage .....		200,000.00				
Jamestown & Franklin Railroad Co. First mortgage .....		298,000.00				
Jamestown & Franklin Railroad Co. Second mortgage .....		500,000.00				
Terminal Railway of Buffalo First mortgage .....		500,000.00				
Total par value bonds .....		\$ 1,498,000.00				
Grand total par value stocks and bonds .....		\$128,952,450.00				
The above securities are carried on the books of the company at a total value of \$89,718,446.89.						
TRAFFIC STATISTICS.						
FREIGHT CARRIED AND TON MILEAGE.						
1908 1907 Increase or decrease						
Tons of freight earning revenue .....	26,224,406	34,281,946	8,057,540			
Tons of company freight .....	3,053,484	3,289,630	236,146			
Total number of tons carried .....	29,277,890	37,571,576	8,293,686			
Tons of revenue freight carried one mile .....	4,852,862,871	5,741,263,554	888,400,683			
Tons of company freight carried one mile .....	227,072,584	262,790,359	35,717,775			
Total number of tons carried one mile .....	5,079,935,455	6,004,053,913	924,118,458			
NOTE.—Decreases in <i>italics</i> .						
PASSENGERS CARRIED AND TICKET MILEAGE.						
1908 1907 Increase or decrease						
Interline passengers .....	1,072,719	1,100,931	28,212			
Local passengers .....	7,485,626	7,330,235	155,391			
Total number of passengers carried .....	8,558,345	8,431,166	127,179			
Passengers carried one mile .....	491,518,018	488,654,632	2,863,386			

TRAIN MILEAGE.			Increase or decrease.			1908.			1907.			Increase or decrease.			
Freight trains .....	1908. 8,208,002	1907. 9,108,434	900,432			Average number of tons of revenue-earning freight carried per train mile.....	586.5		618.4		31.9				
Passenger trains, exclusive of straight mail and express trains .....	7,294,685	7,361,612	66,927			Average number of tons of all freight (including company's) carried per train mile.....	613.9		646.7		32.8				
Mail and express trains exclusive .....	712,416	994,149	281,733			Average number of revenue tons per loaded car mile.	19.7		20.9		1.2				
Mixed trains .....	66,528	175,296	108,768			Average number of all tons per loaded car mile .....	20.6		21.9		1.3				
Work trains .....	535,090	633,550	98,460			Average number of miles one ton carried, revenue freight .....	185.1		167.5		17.6				
Total train mileage.....	16,816,721	18,273,041	1,456,320			Average number of miles one ton carried, all freight (including company's) .....	173.5		159.8		13.7				
ENGINE MILEAGE.			Increase or decrease.			Average number of loaded cars per train mile .....	29.8		29.6		0.2				
Freight engines .....	9,366,484	11,353,531	1,987,047			Average number of empty cars per train mile .....	16.2		12.4		3.8				
Passenger engines .....	8,386,120	8,805,511	419,391			Average number of freight cars per train mile .....	46.0		42.0		4.0				
Switching engines .....	5,964,734	7,500,923	1,536,189			PASSENGER RESULTS.									
Work engines .....	1,006,731	1,357,801	351,070												
Total engine mileage.....	24,724,069	29,017,766	4,293,697												
CAR MILEAGE.			Increase or decrease.												
Loaded freight cars.....	246,411,772	274,549,595	28,137,823												
Empty freight cars (including caboose car mileage).....	134,078,958	115,286,749	18,792,209												
Total freight car mileage.....	380,490,730	389,836,344	9,345,614												
Passenger cars .....	52,877,061	55,037,716	2,160,655												
Work cars .....	2,775,777	6,458,992	3,683,215												
Total car mileage.....	436,143,568	451,333,052	15,189,484												
Miles of road, including trackage, operated in freight service .....	1,511.10	1,520.35	9.25												
Miles of road, including trackage, operated in passenger service .....	1,529.80	1,539.05	9.25												
NOTE.—Decreases in <i>italics</i> .															
FREIGHT RESULTS.			Increase or decrease.												
	1908.	1907.													
Earnings from transportation.....	\$25,454,972.80	\$30,596,387.38	\$5,141,414.58												
Earnings from misc. sources..	480,500.44	515,094.74	34,594.30												
Total freight earnings.....	\$25,935,473.24	\$31,111,482.12	\$5,176,008.88												
Earnings per ton .....	cts. 97.1	cts. 89.2	cts. 07.9												
Earnings per ton per mile....	cts. 0.525	cts. 0.533	cts. 0.008												
Earnings per train mile.....	\$3.08	\$3.30	\$0.22												
Earnings per mile of road operated in freight service —trackage included .....	\$17,163.31	\$20,463.37	\$3,300.06												
Density of freight traffic (i.e., tons carried one mile per mile of road) .....	3,361,747	3,949,126	587,379												
Total road operated.....		1,746.46													
The capital stock authorized on December 31, 1908, was.....		\$18,738,000.00													
The funded debt outstanding on December 31, 1907, was.....		\$26,765,000.00													
It has been decreased during the year ended December 31, 1908, as follows:															
Michigan Central-Jackson, Lansing & Saginaw 3 1/2 per cent. gold bonds of 1951 purchased and canceled by the Trustees of the Land Grant Fund of the Jackson, Lansing & Saginaw Railroad Company.....		\$10,000.00													
Michigan Central-Terminal 4 per cent. bonds of 1941 retired in exchange for Indiana Harbor Belt 4 per cent. bonds.....		725,000.00	735,000.00												
Total funded debt December 31, 1908 (detail on another page).....		\$26,030,000.00													
SUMMARY OF FINANCIAL OPERATIONS AFFECTING INCOME.			1908.			1907.			1908.			Increase or decrease.			
				1,746.46	1,746.46										
EARNINGS FROM OPERATION. miles operated. miles operated.						or									
From freight traffic.....	\$16,947,001.50	\$19,926,803.28	\$2,979,801.78												
From passenger traffic.....	6,168,190.19	6,541,102.67	372,912.48												
From express traffic.....	1,040,663.03	1,241,632.68	200,969.65												
From transportation of mails .....	413,540.83	429,173.16	15,632.33												
From rentals .....	43,536.34	31,786.18	11,750.16												
From miscellaneous sources.....	305,556.06	376,611.97	71,055.91												
Totals .....	\$24,918,387.95	\$28,547,109.94	\$3,628,621.99												
EXPENSES OF OPERATION. (76.27%)		(81.03%)	(4.76%)												
For maintenance of way and structures .....	\$3,061,374.85	\$4,991,923.14	\$1,930,548.29												
For maintenance of equipment .....	2,978,743.87	4,070,277.11	1,091,533.24												
NOTE.—Decreases in <i>italics</i> .															

For conducting transportation .....	12,406,032.50	13,503,986.92	1,097,954.42
For general expenses.....	559,201.12	565,563.48	6,362.36
<b>TOTAL EXPENSES</b> .....	<b>\$10,005,352.34</b>	<b>\$23,131,750.65</b>	<b>\$1,126,398.31</b>
NET EARNINGS .....	\$5,913,135.61	\$5,415,359.29	\$497,776.32
OTHER INCOME .....	655,505.40	702,518.99	47,013.59
<b>GROSS INCOME</b> .....	<b>\$6,568,641.01</b>	<b>\$6,117,878.28</b>	<b>\$450,762.73</b>
FIRST CHARGES.			
Interest on funded debt.....	\$2,268,938.33	\$2,098,230.00	\$170,708.33
Rentals of leased lines.....	510,310.00	568,200.42	57,890.42
Taxes .....	1,105,694.21	1,008,775.79	96,918.42
Interest on loans, notes and bills payable.....	842,176.27	702,006.59	140,169.68
Interest on equipment trust certificates .....	214,402.05	11,300.00	203,102.05
Totals .....	\$4,941,520.86	\$4,388,512.80	\$553,008.06
BALANCE AVAILABLE FOR DIVIDEND .....	\$1,627,120.15	\$1,729,365.48	\$102,245.33
Cash dividends (in 1908, 6%; in 1907, 8%) .....	1,124,280.00	1,499,040.00	37,760.00
<b>SURPLUS</b> .....	<b>\$502,840.15</b>	<b>\$230,325.48</b>	<b>\$272,514.67</b>
NOTE.—Decreases in <i>italics</i> .			
Surplus for the year .....			\$502,840.15
Amount to credit of Profit and Loss, December 31, 1907 .....			9,131,127.34
			\$9,633,967.49
Deduct:			
Expenses of extension Canada Southern First Mortgage bonds.....			\$141,291.45
Loss on sale of Chicago, Indiana & Southern bonds .....			315,107.44
Discount, commissions and expenses on account of Equipment Trust certificates .....			257,721.27
Use of Indiana Harbor Belt terminal facilities prior to 1908 .....			109,446.60
Adjustment of sundry accounts .....			69,386.67
Balance to credit of Profit and Loss, December 31, 1908 .....			\$8,741,014.06

The gross earnings were \$24,918,487.95, a decrease of \$3,628,621.99 from the previous year.

The freight earnings were \$16,947,001.50, a decrease of \$2,979,801.73. This was due to a decreased movement in nearly all commodities.

The passenger earnings were \$6,168,190.19, a decrease of \$372,912.48, due to a general decrease in both local and interline business.

The express earnings were \$1,040,603.03, a decrease of \$200,969.65.

Earnings from transportation of mails were \$413,540.83, a decrease of \$15,632.33.

The total expenses of operation were \$19,005,352.34, a decrease of \$4,126,398.31.

Maintenance of way and structures decreased \$1,930,548.29; due to the general economies effected and reduced expenditures for new buildings, separation of grades, new yards, logging branches, etc.

Maintenance of equipment decreased \$1,091,533.24: largely due to the reduction in expenditures for repairs on account of idle equipment during the business depression.

Conducting transportation decreased \$1,097,954.42; due principally to the falling off in the volume of traffic handled and a general curtailment of expenses. The decrease in car mileage—per diem account was caused by the preference given to loading of this company's cars and by the change in the rate of per diem on March 1, 1908, from 50 cents to 25 cents. The increase in rents for tracks, yards and terminals is on account of additional expenditures for terminal facilities; and the increase in expenses of stock yards and elevators is on account of extraordinary expenditures incident to the aphthous fever epidemic.

The net earnings were \$5,913,135.61, an increase of \$497,776.32.

Other income was \$655,505.40, a decrease of \$47,013.59.

First charges increased \$553,008.06, the principal items being interest on additional bonds and equipment trust certificates issued, increased rate on Canada Southern first mortgage bonds, and interest on loans.

The profit from operation for the year, after payment of 6% in dividends upon the capital stock, was \$502,840.15, which has been carried to the credit of profit and loss.

Total cost of road and equipment to December 31, 1908. \$35,213,257.09

This represents per mile owned (270.07 miles) \$130,386

Joliet and Northern Indiana Railroad Construction account was increased by expenditures for elevation of tracks in the City of Joliet. ....

\$71,338.77

Terminal Railroad (Chicago) Construction account was decreased by expenditures for construction assumed by the Indiana Harbor Belt Railroad Company as explained below. ....

\$823,443.17

Jackson, Lansing & Saginaw Railroad Construction account was decreased by purchase and retirement of bonds as previously commented upon. ....

\$10,000.00

On January 1, 1908, the Indiana Harbor Belt Railroad Company having taken over the ownership and control of the Terminal Railroad property, in accordance with the terms of the agreement of January 29, 1907, there were retired \$725,000 of Michigan Central-Terminal Railroad four per cent. bonds, in exchange for which a like amount of Indiana Harbor Belt Railroad general mortgage four per cent. bonds were issued. During the year this company received from the Indiana Harbor Belt Railroad Company \$105,000 of the latter issue of bonds in consideration of the transfer and delivery to the Indiana Harbor Belt Railroad Company of 1058 shares of the capital stock of the Calumet Western Railroad Company. The Michigan Central Railroad Company further received from the Indiana Harbor Belt Railroad Company \$98,443.17 in cash, in reimbursement of the amount expended for the construction of the Terminal Railroad in excess of the proceeds of the \$725,000 Michigan Central-Terminal Railroad bonds above mentioned.

Under agreement of December 4, 1907, covering reorganization of the Toledo Terminal Railroad Company (in succession to Toledo Railway and Terminal Company), this company acquired 12 per cent, viz.: 4,800 shares, of the outstanding capital stock of the Toledo Terminal Railroad Company, and guaranteed interest on that company's four and one-half per cent. fifty-year bonds of 1957, aggregating \$6,000,000.00, in proportion to stock holdings.

There were sold during the year \$3,825,000.00 four per cent. First Mortgage bonds of the Chicago, Indiana & Southern Railroad Company, and \$115,000.00 general mortgage four per cent. bonds of the Indiana Harbor Belt Railroad Company.

On January 1, 1908, \$14,000,000.00 Canada Southern first mortgage five per cent. bonds were extended to January 1, 1913, at six per cent.

Effective January 1, 1908, an agreement, modifying that dated December 29, 1903, was entered into with the Pere Marquette Railroad Company, under the terms of which the annual rental payable by the latter was reduced on account of its relinquishment of the right to use the St. Clair Branch of the Canada Southern Railway between the junction of the Lake Erie and Detroit River Railway, near Courtright, Ontario, and St. Clair Junction, and also that portion of the main line between St. Clair Junction and the crossing of the London & Port Stanley Railway.

The following appointments of officials were made during the year:

January 1, Clyde Brown, General Solicitor.

January 1, Henry Russel, General Counsel.

January 1, Ora E. Butterfield, General Attorney.

July 1, Joseph S. Hall, Assistant General Passenger Agent.

October 7, Frank O. Waldo was appointed Auditor to succeed A. Judson Burt, who died on June 11, 1908.

November 24, the jurisdiction of Charles F. Daly, Vice-President in charge of traffic, was extended to cover freight, mail and express traffic.

W. H. NEWMAN,  
President.

*Summary of First Charges.*

Interest on funded debt .....	\$2,268,938.33
Rentals of leased lines .....	510,310.00
Taxes .....	1,105,694.21
Interest on loans, notes and bills payable.....	842,176.27
Interest on Equipment Trust Certificates.....	214,402.05

Total first charges ..... \$4,941,520.86

*DIVIDENDS.*

Payable July 29, 1908, 3% on 187,380 shares of capital stock .....	\$562,140.00
Payable January 29, 1909, 3% on 187,380 shares of capital stock .....	562,140.00
Total, 6% .....	\$1,124,280.00

*CONDENSED GENERAL BALANCE SHEET, DECEMBER 31, 1908.*

*Assets.*

<i>Cost of road and equipment</i> —	
Michigan Central Railroad—Main line..	\$35,213,257.09
Michigan Air Line Railroad.....	3,299,652.23
Grand River Valley Railroad.....	2,501,715.87
Jackson, Lansing & Saginaw Railroad.....	2,589,921.64
Kalamazoo & South Haven Railroad.....	815,610.24
Detroit & Bay City Railroad.....	4,168,297.78
Bay City & Battle Creek Railroad.....	7,171.75
Battle Creek & Sturgis Railroad.....	330.59
Joliet and Northern Indiana Railroad.....	862,338.77
	14,245,038.87

Total cost of road and equipment.. \$49,458,295.96

<i>Securities owned</i> —	
Stock in sundry companies.....	\$7,784,626.50
Bonds of sundry companies.....	351,976.00
	8,136,602.50

*Other property*—

Real estate, etc., not used in operation .....

302,597.18

Fuel and supplies.....

1,569,779.68

*Current assets*—

Cash charged Treasurer and Local Treasurer .....	\$3,683,939.86
Loans and bills receivable:	
Detroit River Tunnel Co.....	4,297,825.26
Indiana Harbor Belt R. R.....	793,846.61
Chicago, Kalamazoo & Saginaw Ry.....	221,748.50
Chicago, Indiana & Southern R. R.....	195,000.00
Toledo Terminal Railroad.....	34,302.00
Other companies .....	64,393.86
Traffic balances receivable.....	2,833,706.38
Sundry collectible accounts.....	1,535,255.57
	13,660,018.04

Items in suspense .....

146,220.13

\$73,273,513.49

*Liabilities.*

*Capital stock* .....

\$18,738,000.00

*Funded debt* :

Michigan Central 3 1/4% bonds of 1952...	\$14,000,000.00
Grand River Valley 6% bonds of 1909...	1,500,000.00
Detroit & Bay City 5% bonds of 1931...	4,000,000.00
Kalamazoo & South Haven 5% bonds of 1939 .....	700,000.00
Michigan Air Line 4% bonds of 1940...	2,600,000.00
Jackson, Lansing & Saginaw 3 1/2% bonds of 1951 .....	1,730,000.00
Joliet & Northern Indiana 4% bonds of 1957 .....	1,500,000.00
	26,030,000.00

Total capitalization .....

\$44,768,000.00

Three year 5% gold notes of 1910.....

10,000,000.00

*Current liabilities* :

Wages .....	\$738,891.20
Loans and bills payable.....	4,450,000.00
Traffic balances payable.....	748,891.93
Interest and rentals accrued.....	594,031.84
Interest unclaimed .....	28,607.50
Dividend payable January 29, 1909 .....	562,140.00
Dividends unclaimed .....	5,333.00
Sundry accounts payable .....	2,506,145.94
	9,634,041.41

*Accounts with lessor companies* :

Canada Southern Railway Company.....

4,910.67

*Other accounts* :

Insurance Fund—buildings .....

125,547.35

Profit and loss.....

8,741,014.06

\$73,273,513.49

## CAPITALIZATION.

## Capital stock.

Number of shares issued and outstanding.....	187,380	Total par value issued and outstanding .....	\$18,738,000.00
Number of shares authorized.....	187,380	Total par value authorized .....	\$18,738,000.00
value per share .....	\$100.00	Amount of capital stock per mile of road owned (270.07 miles)	\$69,382.00

## Funded debt.

Class of bond.	Date of issue.	Date of maturity.	Amount of authorized issue.	Amount issued and now outstanding.	Rate of interest.	Payable on the first days of
Michigan Central first mortgage.....	1902	May 1, 1952.....	\$18,000,000	\$14,000,000	3 1/2%	May and November.
Grand River Valley first mortgage.....	1879	September 1, 1909	500,000	500,000	6 %	March and September.
Grand River Valley first mortgage.....	1886	September 1, 1909	1,000,000	1,000,000	6 %	March and September.
Detroit & Bay City first mortgage .....	1881	March 1, 1931....	4,000,000	4,000,000	5 %	March, June, September and December.
Kalamazoo & South Haven first mortgage.....	1889	November 1, 1939	700,000	700,000	5 %	May and November.
Michigan Air Line first mortgage .....	1890	January 1, 1940.	2,600,000	2,600,000	4 %	January and July.
Jackson, Lansing & Saginaw first mortgage.....	1901	September 1, 1951	*2,000,000	1,730,000	3 1/2%	March and September.
Joliet & Northern Indiana first mortgage.....	1907	July 10, 1957....	3,000,000	1,500,000	4 %	January and July 10.
Total amount of funded debt.....					\$26,030,000	

\* \$270,000 purchased and retired by the Land Grant Trustees.

## TWENTIETH ANNUAL REPORT CLEVELAND, CINCINNATI, CHICAGO &amp; ST. LOUIS RAILWAY CO.:—FOR YEAR ENDED DECEMBER 31, 1908.

## To the stockholders of

THE CLEVELAND, CINCINNATI, CHICAGO & ST. LOUIS RAILWAY COMPANY:  
The Board of Directors submits herewith the following report for the year ended December 31st, 1908:

The mileage embraced in the operation of the road is as follows:

Main line.....	1,680.97
Branches .....	166.64
Trackage rights.....	134.62
 Total length of road operated.....	1,982.23
Second track.....	338.63
Side tracks.....	1,061.04
 Total mileage of track.....	3,381.90

The total mileage of track operated has been increased during the year as follows:

Side tracks: increased .....	38.05
Side tracks: increased.....	1.21
 Main line: decreased.....	.67
 Total additional tracks.....	38.59

The following is a statement of the capital stock authorized and outstanding on December 31, 1908.

Preferred stock authorized..... \$10,000,000.00

Common stock authorized..... 50,000,000.00

Total preferred and common stock authorized..... \$60,000,000.00

Preferred stock issued and outstanding..... \$10,000,000.00

Common stock issued and outstanding..... 47,056,300.00

Balance common stock authorized but not issued, December 31, 1908..... \$2,943,700.00

The funded debt outstanding December 31, 1907, was..... \$64,612,727.45

This has been increased during the year by the issue of C. C. &amp; St. L. Ry. general mortgage bonds..... \$1,000,000.00

For retirement of prior lien bonds..... 78,000.00

The prior lien bonds retired during the year are as follows:

C. I. St. L. &amp; C. Ry. Co. first mortgage six per cent bonds..... \$6,000.00

C. I. St. L. &amp; C. Ry. Co. general first mortgage four per cent bonds..... 72,000.00

Total funded debt outstanding December 31, 1908..... \$65,612,727.45

There was expended during the year for additions to the property, improvements, double tracking, equipment, etc., and charged to cost of road and equipment, the sum of \$3,210,932.47, as follows:

Cleveland Division..... \$404,213.45

Cincinnati Division..... 420,236.09

St. Louis Division..... 653,559.87

Chicago Division..... 212,623.75

Cairo Division..... 97,059.04

Michigan Division..... 20,451.66

Interest during construction

Cincinnati, St. Louis and Chicago divisions..... 151,852.98

For new equipment..... 1,250,935.63

Total..... \$3,210,932.47

There has been advanced on account of the St. Louis Short Line Division during the year, for construction, \$100,370.73.

There has been advanced to the Central Indiana Railway Company during the year, for improvements and operation, \$76,193.72.

There has been advanced on account of the Chicago and Harrisburg Coal Company property during the year, \$25,497.42.

There has been advanced on account of the Saline and Williamson Counties property during the year, \$18,129.11.

The Evansville, Mt. Carmel and Northern Railway Company was organized under the laws of the State of Indiana, August 1, 1906, and under the laws of the State of Illinois, November 7, 1906 to construct a railroad from Mt. Carmel, on the Cairo Division, to Evansville, Indiana. There has been advanced on account of this property, during the year, \$11,692.82.

The Saline Valley Railway Company was organized under the laws of the State of Illinois, April 6, 1907, for the purpose of constructing a railroad from Harrisburg, Saline County, Illinois, to Marion, Williamson County, Illinois. There has been advanced on account of this property, during the year, \$610.34.

There was sold during the year to the Missouri & Illinois Bridge and Belt Railroad Company, 40 shares of its capital stock, par value \$4,000.00; similarly each of the other proprietary companies surrendered a like amount, making a total of 440 shares, par value \$44,000.00, which that company holds in its treasury uncancelled as "Treasury Assets."

There has been purchased during the year by the Central Trust Company, Trustee for the C. C. & St. L. Ry. Company's St. Louis Division first collateral trust mortgage bonds, 21 bonds, par value \$21,000.00, making a total of 520 bonds at par value of \$520,000, now held by the Central Trust Company, Trustee.

## SUMMARY OF FINANCIAL OPERATIONS AFFECTING INCOME.

	1908 Miles operated	1907 Miles operated	Increase or decrease
EARNINGS FROM OPERATION.			
From freight traffic.....	\$15,711,940.70	\$17,238,347.59	\$1,526,406.89
From passenger traffic.....	6,908,325.96	7,127,049.44	217,723.48
From express traffic.....	757,853.86	849,998.84	92,145.98
From transportation of mails.....	716,673.35	741,728.05	25,054.70
From rentals.....	503,318.75	464,533.10	\$38,785.65
From miscellaneous sources.....	23,548.23	26,147.25	2,599.02
Totals .....	\$24,621,660.85	\$26,447,804.27	\$1,826,143.42
EXPENSES OF OPERATION.	(78.11%)	(76.13%)	(1.98%)
For maintenance of way and structures .....	\$2,611,391.72	\$3,432,738.28	\$821,346.56
For maintenance of equipment .....	3,801,196.10	4,209,998.30	408,802.20
For conducting transportation .....	12,200,907.91	11,868,537.02	\$322,370.89
For general expenses.....	618,028.61	622,355.61	4,327.00
TOTAL EXPENSES .....	\$19,231,524.34	\$20,133,629.21	\$902,104.87
NET EARNINGS .....	\$5,390,136.51	\$6,314,175.06	\$924,038.55
OTHER INCOME.			
Dividends on stocks owned.....	\$57,324.90	\$78,452.24	\$21,127.34
Interest on railroad bonds owned .....	43,420.00	43,012.11	407.89
Interest on loans, notes and sundry accounts .....	36,660.73	65,079.38	28,418.65
Totals .....	\$137,405.63	\$186,543.73	\$49,138.10
GROSS INCOME .....	\$5,527,542.14	\$6,500,718.79	\$973,176.65
FIRST CHARGES.			
Interest on funded debt....	\$3,030,935.67	\$2,989,581.11	\$41,354.56
Taxes on real estate.....	812,766.67	758,155.98	54,610.69
Taxes on gross earnings.....	81,609.85	84,736.96	3,127.11
Railroad commissioners' assessments .....	966.87	988.07	21.20
Use joint facilities; fixed interest basis .....	224,094.31	204,505.08	19,589.23
Rentals of other property .....	80,784.45	74,948.31	5,836.14
Interest on loans, notes and bills payable .....	587,605.62	414,585.84	173,019.78
Totals .....	\$4,818,763.44	\$4,527,501.35	\$291,262.09
NET INCOME .....	\$708,778.70	\$1,973,217.44	\$1,264,438.74
Cash dividends preferred, four, aggregating 5%....	\$500,000.00	\$500,000.00	

	1908.	1907.	Increase or decrease
Cash dividends, common, two, aggregating 3%.....		1,411,689.00	\$1,411,689.00
Totals .....	\$500,000.00	\$1,911,689.00	\$1,411,689.00
SURPLUS .....	\$208,778.70	\$61,528.44	\$147,250.26

NOTE—Decreases in *italics*.

To the surplus for the year—	\$208,778.70
There should be added:	
Adjustment of sundry accounts to conform to requirements of classifications prescribed by Interstate Commerce Commission, etc. ....	\$404,303.55
Less discount, commissions and expenses in connection with New York Central Lines Equipment Trust of 1907, discount on C. C. & St. L. Ry. General Mortgage Bonds and adjustment of sundry other accounts.....	<u>382,189.28</u>
Amount to credit of profit and loss, December 31, 1907 .....	\$230,892.97
BALANCE, DECEMBER 31, 1908.....	<u>1,847,567.88</u>
	<u>\$2,078,460.85</u>

The gross earnings were \$24,621,660.85, a decrease of \$1,826,143.42. The freight earnings were \$15,711,940.70, a decrease of \$1,526,406.89. The local earnings show a decrease of 9%, and the interline a decrease of 11%.

The passenger earnings were \$6,908,325.96, a decrease of \$218,723.48. The local earnings show a decrease of 4% and the interline a decrease of 1%.

The express earnings were \$757,853.86, a decrease of \$92,144.98, due to the general business conditions.

The mail earnings were \$716,673.35, a decrease of \$25,054.70, due to reduced Government allowance.

The rent earnings were \$503,318.75, an increase of \$38,785.65, due chiefly to increased rentals received from foreign roads.

The expenses of operation were \$19,231,524.34, a decrease of \$902,104.87.

Maintenance of way and structures showed a decrease of \$821,346.56, which is general and made possible by the high standard previously maintained; the only important item of increase being in the renewals.

Maintenance of equipment showed a decrease of \$408,802.20, which is general and was also made possible by the high standard previously maintained; the only important item of increase being in renewals of freight cars.

Conducting transportation showed an increase of \$332,370.89. The principal fluctuations were as follows:

Fuel for locomotives decreased \$134,253.11.

Engine and roundhouse men, train service and supplies decreased \$239,439.43.

Station, yard, telegraph service and supplies decreased \$219,837.46.

Car mileage and per diem balance increased \$639,602.60, due to decreased demand for system cars on foreign roads and the adjustment of reclaims accrued in prior years.

Loss and damage increased \$251,833.83, due chiefly to the settlement of deferred claims, largely the result of congestion in the latter months of the year previous, and the increase in fire claims as the result of this year's midsummer drouth.

The net earnings were \$5,390,136.51, a decrease of \$924,038.55.

Other income was \$137,405.63, a decrease of \$49,138.10, due principally to decreased interest earned from notes and deposits.

First charges were \$4,818,763.44, a net increase of \$291,262.09. The principal fluctuations consisted of an increase in interest on funded debt, due to the issue of additional bonds, increased taxes and increased interest on loans.

The net income for the year, after paying first charges, was \$708,778.70 out of which was paid a dividend of 5% on preferred stock, leaving a surplus for the year of \$208,778.70.

On the pages following will be found the general balance sheets and tabulated statements showing results of operation for the year.

There will also be found following this report, statements showing the financial condition and results from operation of the Peoria & Eastern Railway and the Cincinnati Northern Railroad for the year.

The operation of the Kankakee and Seneca Railroad for the year (for which separate accounts are kept) shows earnings \$87,596.91, operating expenses and taxes \$103,478.46, deficit \$16,281.55.

The Mt. Gilead Short Line (for which separate accounts are kept) shows earnings for the year \$5,496.12, operating expenses and taxes \$7,527.02, deficit \$2,030.90.

The following changes in organization occurred during the year:

On January 1, 1908, Messrs. Glennon, Cary, Walker & Howe were appointed General Attorneys in charge of legal matters at Chicago and its vicinity.

On January 1, 1908, Mr. Leonard J. Hackney was appointed General Counsel.

On January 1, 1908, Mr. Clyde Brown was appointed General Solicitor.

On January 10, 1908, Mr. Frank Littleton was appointed General Attorney.

On November 24, 1908, the jurisdiction of Mr. Charles F. Daly, Vice-President, in charge of passenger traffic was extended to cover freight, mail and express traffic.

W. H. NEWMAN, President.

FIRST CHARGES.	
Interest on bonds.....	\$3,030,935.67
Taxes on real estate.....	812,766.67
Taxes on gross earnings.....	81,609.85
Railroad commissioners' assessments.....	966.87
Use joint facilities: fixed interest basis.....	224,094.31
Rentals of other property.....	80,784.45
Interest on loans, notes and bills payable.....	587,605.62
TOTAL FIRST CHARGES.....	<u>\$4,818,763.44</u>

CONDENSED GENERAL BALANCE SHEET, DECEMBER 31, 1908

Assets	\$125,701,334.03
Cost of road and equipment.....	<u>\$125,701,334.03</u>

Securities owned	
Stocks of other companies.....	\$2,127,970.59

Bonds of other companies.....	<u>3,626,962.03</u>
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Advances	
Kankakee & Seneca R. R. Co.....	\$117,000.00
Central Indiana Ry. Co.....	780,128.88
Short Line Division.....	1,328,830.57
Saline and Williamson Counties prop'ty.....	968,302.07
Chicago & Harrisburg Coal Co. prop'ty.....	58,931.07
Springfield Union Depot Co.....	1,840.00
Cincinnati Union Depot.....	60,000.00
Real estate.....	41,151.20
Evansville, Mt. Carmel & Northern Ry. Co.....	203,551.00
Saline Valley Ry. Co.....	12,058.64
	<u>3,571,793.43</u>

Fuel and supplies	
Current assets	

Cash charged Treasurer.....	\$519,184.62
Cash in transit.....	1,728,319.65
Cash in banks to pay coupons, dividends, etc.....	467,103.37
Loans and bills receivable.....	131,934.79
Traffic balances receivable.....	858,793.83
Sundry collectible accounts.....	2,573,483.19
	<u>6,278,819.45</u>

Items in suspense	
New car contracts (per contra).....	\$509,274.52

Other items.....	21,370.64
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	<u>530,645.16</u>
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Accounts with lessor and other companies	
Peoria and Eastern Railway Co.....	\$55,265.96

Kankakee and Seneca R. R. Co.....	42,999.60
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	<u>98,265.56</u>
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Liabilities.	
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Capital stock	
Common .....	\$47,056,300.00

Preferred .....	10,000,000.00
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	<u>\$57,056,300.00</u>
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Funded debt	
C., I., St. L. & C. Ry. first mortgage 6 per cent. bonds .....	\$635,000.00
C., I., St. L. & C. Ry. general first mortgage 4 per cent. bonds.....	7,323,000.00
C., C. & I. Ry. first consolidated mortgage bonds .....	4,138,000.00
C., C. & I. Ry. general consolidated mortgage bonds .....	3,205,000.00
I. & St. L. R.R. first mortgage bonds .....	2,000,000.00
I. & St. L. Ry. first mortgage bonds .....	500,000.00
C., C. & St. L. Ry. (C., V. & C. Ry.) first mortgage bonds .....	5,000,000.00
C., S. & C. R.R. first consolidated mortgage bonds .....	2,571,000.00
C., C., C. & St. L. Ry. (Springfield & Columbus Div.) first mortgage bonds .....	1,103,730.00
C., C., C. & St. L. Ry. (W. W. Valley Div.) mortgage bonds .....	650,000.00
C., C. & St. L. Ry. (St. L. Div.) 1st collateral trust mortgage bonds .....	10,000,000.00
C., C., C. & St. L. Ry. (C., W. & M. Div.) mortgage bonds .....	4,000,000.00
C., C. & St. L. Ry. general mortgage bonds .....	24,058,000.00
C., S. & C. preferred stock and scrip .....	428,997.45
	<u>65,612,727.45</u>

Total capitalization .....	
5 per cent. 4-year gold notes .....	<u>\$122,669,027.45</u>

	<u>5,000,000.00</u>
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Current liabilities:	
Wages and supplies.....	\$4,152,398.25
Bills payable—L. S. & M. S. Ry. Co. ....	5,500,000.00
Bills payable—Dayton & Un. R.R. Co.....	112,500.00
Bills payable—other .....	3,425.00
Traffic balances payable .....	178,980.32
Interest accrued .....	494,601.47
Bond interest due Jan. 1, 1909 .....	383,020.00
Bond interest unclaimed .....	70,329.50
Dividends unpaid—preferred stock payable Jan. 20, 1909 .....	125,000.00
Dividends unclaimed .....	17,193.87
	<u>11,037,448.41</u>

New car contracts (per contra).....	
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	<u>509,274.52</u>
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Items in suspense:	
Mt. Gilead Short Line Ry. ....	<u>2,444.59</u>

Trust equipment replacement fund.....	
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	<u>5,314.00</u>
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Profit and loss .....	
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